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AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY WITH INDEXES

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Table of Contents

Records are arranged in categories 51 through 55, the Life Sciences division of *STAR*. Selecting a category will link you to the collection of records cited in this issue pertaining to that category.

51 Life Sciences (General) 1

52 Aerospace Medicine 8

Includes physiological factors; biological effects of radiation; and effects of weightlessness on man and animals.

53 Behavioral Sciences 12

Includes psychological factors; individual and group behavior; crew training and evaluation; and psychiatric research.

54 Man/System Technology and Life Support N.A.

Includes human engineering; biotechnology; and space suits and protective clothing.

55 Space Biology N.A.

Includes exobiology; planetary biology; and extraterrestrial life.

Indexes

Two indexes are available. You may use the find command under the tools menu while viewing the PDF file for direct match searching on any text string. You may also view the indexes provided, for searching on *NASA Thesaurus* subject terms and author names.

Subject Term Index ST-1

Author Index PA-1

Selecting an index above will link you to that comprehensive listing.

Appendix

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Typical Report Citation and Abstract

ACCESSION NUMBER ↓

DOCUMENT ID NUMBER → **19960021053;** 96N24540 NASA Langley Research Center, Hampton, VA USA. ← CORPORATE SOURCE

TITLE → **An Extended Compact Tension Specimen for Fatigue Crack Propagation and Fracture**

AUTHORS → Piascik, R. S., NASA Langley Research Center, USA; Newman, J. C., Jr., NASA Langley Research Center, USA; ← AUTHORS' AFFILIATION

PUBLICATION DATE → Mar. 1996, pp. 16; In English

CONTRACTS/GRANTS → Contract(s)/Grant(s): RTOP 538–02–10–01

REPORT NO.(S) → Report No.(s): NASA–TM–110243; NAS 1.15:110243; No Copyright; Avail: CASI A03, Hardcopy; A01, Microfiche ← AVAILABILITY AND PRICE CODE

ABSTRACT → An extended compact tension specimen, EC(T) has been developed for fatigue and fracture testing. Documented herein are stress-intensity factor and compliance expressions for the EC(T) specimen.

ABSTRACT AUTHOR → Author

SUBJECT TERMS → *Crack Propagation; Stress Intensity Factors; Fatigue (Materials)*

AEROSPACE MEDICINE AND BIOLOGY

A Continuing Bibliography (Suppl. 424)

OCTOBER 14, 1996

51
LIFE SCIENCES (GENERAL)

19960037250; 96A66943
Transient analysis on the artificial mechanical valve-blood interaction system by using the finite element method
Chen, Dapeng, Southwest Jiaotong Univ, China; Zhang, Jianhai; Zou, Shengquan; Applied Mathematics and Mechanics (English Edition); May 1995; ISSN 0253-4827; vol. 16, no. 5, pp. 437-442; In English; Copyright; Avail: Issuing Activity

The blood-mechanical heart valve interaction system subjected to a load of step pressure at the moment that the valve is in its closing position was analyzed by using the finite element method here. The analysis shows that (1) the mechanical valves transient dynamical performances tend to be very stiff and as a result, high impinging pressure is induced no matter the valves are made of pyrolytic carbon, Ti alloy, Co-Cr alloy or ceramics; (2) the impinging pressure acted on the valve of the blood-valve system can be reduced by decreasing the elastic modulus of the mechanical valve.
Author (revised by EI)
Computational Fluid Dynamics; Heart Valves; Organs

19960037473; 96A67166
Synthesis and immunochemical properties of peptide fragments of hepatitis C virus E1, NS3, NS4 proteins
Evstigneeva, R. S., Moskovskij Inst Tonkoj Khimicheskoj Tekhnologii im. M.V. Lomonosova, Russia; Prokuronova, E. I.; Zheltukhina, G. A.; Grigor'ev, D. N.; Niyazmatov, A. A.; Doklady Akademii Nauk; December 1994; ISSN 0002-3264; vol. 339, no. 4, pp. 489-492; In Russian; Copyright; Avail: Issuing Activity

The work was aimed to the search of antigene sites in less well studied regions of HCV proteins, chemical synthesis of these fragments and their immunochemical investigation using the reactions with blood serum of hepatitis C patients. The using of E-1 protein or peptides from this protein could be important for the diagnostics of late stages of the disease. The structure of E1 protein was examined using a set of commercial programs on hydrophilicity, mobility and other characteristics. As a result a peptide fragment was isolated having promising antigene properties. The scheme of the peptide synthesis is given.
Author (EI)
Antigens; Immunology; Proteins

19960037604; 96A67297
In vivo measurement of frequency characteristics of phase velocity of bone with bending vibration
Kanai, H.; Park, M.; Chubachi, N.; Electronics Letters; November 9 1995; ISSN 0013-5194; vol. 31, no. 23, pp. 1969-1971; In English; Copyright; Avail: Issuing Activity

The authors propose a new method of measuring the frequency characteristics of phase velocity along a bone for bending vibration modes to diagnose its mechanical characteristics. by introducing a simple model of a distributed-constant network, the phase velocity is determined for each frequency from the spatial distribution of velocity along a radius bone surface which is measured by the ultrasonic Doppler method.
Author (EI)
Bending Vibration; Bioengineering; Bones; Frequency Distribution; Frequency Measurement; Phase Velocity; Ultrasonic Tests; Velocity Measurement

19960037694; 96A67387
Database of 'in vivo' measurements for quantitative microwave imaging and reconstruction algorithms available
ANON; IEEE Antennas & Propagation Magazine; October 1995; ISSN 1045-9243; vol. 37, no. 5, pp. 87-89; In English; Copyright; Avail: Issuing Activity

Reconstruction algorithms and equipment have been developed for microwave imaging, with emphasis on noninvasive control of deep hyperthermia treatments. Tomographic reconstruction algorithms have also been developed for qualitative spectral and quantitative spatial iterations. The data can be accessed from the e-mail address ftp voltor.upc.es.
Author (EI)
Algorithms; Image Reconstruction; Imaging Techniques; Medical Equipment; Microwave Imagery

19960037981; 96A67674

Interaction of physical and biological objects with Ka-band electromagnetic radiation

Petrosyan, V. I.; Gulyaev, Yu. V.; Zhiteneva, E. A.; Elkin, V. A.; Sinitsyn, N. I.; Radiotekhnika i Elektronika; January 1995; ISSN 0033-8494; vol. 40, no. 1, pp. 127-134; In Russian; Copyright; Avail: Issuing Activity

A method is developed for registration of object response on electromagnetic EHF radiation (millimeter waves) by using microwave radiometers at the frequencies 1 and 0.4 GHz. The BWT and klystrons were used as sources of millimeter waves. Identity of resonance spectra of human and animal tissues as well as water was found. The influence of magnetic field on the EHF spectra was found and studied. Resonance EHF interaction with media is shown to be a threshold effect of the small power level. A new type of radio spectroscopy is suggested that is called as resonance-transmission EHF/SHF radio spectroscopy.

Author (EI)

Biology; Extremely High Frequencies; Microwaves; Millimeter Waves; Radiation Effects; Radiometers

19960039131; 96A68204

Chemical constitution and abrasive wear behaviour of pangolin scales

Tong, J., Jilin Univ, China; Ren, L.-Q.; Chen, B.-C.; Journal of Materials Science Letters; October 15 1995; ISSN 0261-8028; vol. 14, no. 20, pp. 1468-1470; In English; Copyright; Avail: Issuing Activity

Adhesion, friction, and abrasive wear of soil engaging components of agricultural machines and implements seriously decrease their efficiency and quality in working. Chen et al. have carried out bionics research on methods of soil adhesion and friction based on the fact that soil animals can move in soil without soil sticking to them. In this study, the scales used for experiments are taken from a pangolin. Specimens are cut from the scales, and polished and cleaned for XRD and amino acid analysis. Two types of specimens are prepared. Two different grades of quartz sand and bentonite of 76 micron diameter are used as abrasive. The abrasion test is conducted on a rotary disc type abrasive wear tester. The abrasion depth is recorded after the tests.

Author (EI)

Adhesion; Angle of Attack; Biology; Composition (Property); Wear; X Ray Diffraction

19960039571; 96A68644

Space power method for human heart diagnosis

Doi, Tatsuya, Hosei Univ, Japan; Hayano, Seiji; Saito, Yoshifuru; IEEE Transactions on Magnetics; November 1995; ISSN 0018-9464; vol. 31, no. 6, pt. 2, pp. 4262-4264; In English; Copyright; Avail: Issuing Activity

Recently, it has shown that the medical diagnosis of human heart is reduced to searching for the defect positions of electrical conducting path in the human heart. The electrical conducting path searching in the human heart is one of the inverse source problems which is difficult to get unique solutions. This paper proposes an approach to identifying the electrical conducting paths in the human heart by measuring both of the local magnetic and electric fields. As a result, it is revealed that our method makes it possible to show the distinguished differences between the normal and abnormal human hearts.

Author (EI)

Bioelectricity; Cardiology; Cardiovascular System; Electrophysiology

19960039572; 96A68645

Spatio-temporal MEG patterns produced by spreading multiple dipoles

Iramina, Keiji, Kyushu Univ, Japan; Ueno, Kenichi; Ueno, Shoogo; IEEE Transactions on Magnetics; November 1995; ISSN 0018-9464; vol. 31, no. 6, pt. 2, pp. 4265-4267; In English; Copyright; Avail: Issuing Activity

A spreading multiple dipole model which can describe the spatial distribution of sources is proposed. Using the source model, spatio-temporal patterns of MEGs are simulated. Effects of the spreading multiple dipoles on spatio-temporal magnetic fields are investigated. We showed that the topography of the peak latency is able to give important information in estimating the source in the brain.

Author (EI)

Bioelectric Potential; Brain; Electroencephalography; Magnetic Fields; Neurophysiology

19960039907; 96N31062 Tulsa Univ., OK USA

Chromophore attachment in the cyanobacterial light harvesting proteins ***Final Report, Jun. 1992- Nov. 1995***

Anderson, Lamont K., Tulsa Univ., USA; Nov. 28, 1995; 10p; In English

Contract(s)/Grant(s): DAAL03-92-G-0248

Report No.(s): AD-A304917; No Copyright; Avail: CASI; A02, Hardcopy; A01, Microfiche

Light harvesting in the cyanobacteria is conducted by a complex, self-assembling structure called the phycobilisome, which contains a number of proteins that have covalently linked bilin chromophores (the biliproteins). We have utilized a protein engineering approach to study the structural determinants of chromophore attachment to the biliproteins. As the project developed, we discovered that disruption of the biliprotein subunit structure resulted in severe degradation in vivo. We have established that the earliest interactions in the phycobilisome assembly pathway are crucial to the stability of these proteins and must occur accurately and rapidly to avoid degradation. We have examined the role of chromophore attachment in protein stability and the data indicate that covalent attachment of the central bilins in both alpha and Beta subunits is needed to stabalize these proteins for assem-

bly. We have used domain exchange experiments to examine chromophore attachment and have found three residues that appear to be required for protein stability and chromophore attachment. We have developed a system for investigating the molecular basis of recognition and docking between biliprotein alpha and Beta subunits and have preliminary results from this work.
DTIC
Bacteria; Degradation; Proteins; Chromophores; Stability; Covalence

19960040805; 96A69680
Dependence of apatite formation on silica gel on its structure: effect of heat treatment
Cho, S.-B., Kyoto Univ, Japan; Nakanishi, K.; Kokubo, T.; Soga, N.; Ohtsuki, CH.; Nakamura, T.; Kitsugi, T.; Yamamuro, T.; Journal of the American Ceramic Society; July 1995; ISSN 0002-7820; vol. 78, no. 7, pp. 1769-1774; In English; Copyright; Avail: Issuing Activity

The prerequisite for glasses and glass-ceramics to bond to living bone is the formation of biologically active bonelike apatite on their surfaces in the body. Our previous study showed that a silica gel prepared by a hydrolysis and polycondensation of tetraethoxysilane in aqueous solution containing poly(ethylene glycol) induces apatite nucleation on its surface in a simulated body fluid. In the present study, the effects of heat treatment of silica gel on its catalytic effects in apatite nucleation was investigated in a simulated body fluid. It was found that apatite forms on the surfaces of silica gels heat-treated below 800 C, but not on those heat-treated above 900 C. The volume of nanometer-range pores in the gel remarkably decreased by heat treatment above 900 C. The concentration of silanol groups in the silica gels gradually decreased with increasing heat treatment temperature. The rate of silica dissolution from the gel into the simulated body fluid decreased remarkably by heat treatment above 900 C. This suggested that a special type of silanol group which is formed by soaking the gel treated below 800 C into the simulated body fluid is responsible for apatite nucleation.
Author (EI)
Bioengineering; Calcium Phosphates; Heat Treatment; Orthopedics; Silica Gel

19960041195; 96N31226 Oregon State Univ., Corvallis, OR USA
Push-Pull Test for In-Situ Determination of Microbial Metabolic Activities: Denitrification and Methanogenesis
Odenthal, Paul J., Oregon State Univ., USA; Sep. 1995; 76p; In English
Report No.(s): AD-A304749; No Copyright; Avail: Issuing Activity (Defense Technical Information Center (DTIC)), Microfiche

Quantitative information on subsurface microbial processes is needed for many applications, but information obtained by existing methods can be difficult to interpret. The goal of this project was to develop a single well, 'push-pull' test for the determination of in situ microbial metabolic activities. The method consists of an injection of a test solution into an existing monitoring well followed by the extraction of the groundwater/test solution mixture from the same well. The test solution consists of a tracer and one or more reactive solutes selected to investigate the activity of a specific microbial system. During the extraction phase, the concentrations of all components of the test solution and potential reaction products are measured and used to develop breakthrough curves. A series of tests were used to investigate the processes of denitrification and methanogenesis by injecting solutions with nitrate, nitrite, or dissolved hydrogen gas in a petroleum contaminated, anaerobic zone of an unconfined, alluvial aquifer and in an uncontaminated, aerobic zone of the same aquifer located directly upgradient of the contaminated zone. Nitrate and nitrite injections yielded utilization rates that were approximately 2.5 times greater in the contaminated zone (than in the uncontaminated zone) where 80% of the injected nitrate mass and 90% of the injected nitrite mass were utilized. During the nitrate injection tests, trace amounts of produced nitrite were detected. The hydrogen injection test resulted in a 60% loss of hydrogen with no detectable methane production in the contaminated well. The 'push-pull' field procedure developed in this project was shown to be capable of determining and quantifying microbial metabolic activity in situ.
DTIC
Evaluation; Injection; Mass; Alluvium; Hydrogen; Gases; Mixtures; Aquifers

19960041239; 96N31266 Argonne National Lab., Materials Science Div., IL USA
Comparing TOF-SIMS with laser desorption/photoionization for surface analysis
Trevor, Jennifer L., Argonne National Lab., USA; Hanley, Luke, Argonne National Lab., USA; Pellin, Michael J., Argonne National Lab., USA; Lykke, Keith R., Argonne National Lab., USA; [1996]; 7p; In English; 44; American Society of Mass Spectrometry on Mass Spectrometry and Allied Topics, 11 - 15 May 1996, Portland, OR, USA
Contract(s)/Grant(s): W-31-109-eng-38
Report No.(s): ANL/CHM/CP-88956; CONF-9605179-2; DE96-011907; No Copyright; Avail: CASI; A02, Hardcopy; A01, Microfiche

TOF-SIMS has become the standard mass spectrometric tool for the molecular analysis of polymeric, organic, and biological surfaces. However, variations in desorption yields, ionization efficiencies, and ion-induced damage of adsorbates still present significant difficulties in the analysis of TOF-SIMS data. Laser desorption combined with photoionization may provide a significant improvement over TOF-SIMS. An instrument exists that has the capability of utilizing both methods of analysis and the potential for imaging of these sur-

faces. The Chicago-Argonne resonance ionization spectrometer for microanalysis (CHARISMA) is a reflection time-of-flight mass spectrometer (TOF) that is configured for secondary ion and neutral mass spectrometry using either ion beam bombardment or laser ablation for sample desorption. We have studied biotin and biotin conjugated self-assembled monolayers (SAMs) adsorbed onto gold as a model to compare the two processes.
DOE
Desorption; Photoionization; Laser Ablation; Biotin; Mass Spectroscopy; Microanalysis

19960041746; 96A69947
Dielectric spectra of heated potatoes
Hart, F. X., Univ of the South, USA; Bodakian, B.; Journal of Materials Science Letters; September 1 1995; ISSN 0261-8028; vol. 14, no. 17, pp. 1214-1217; In English; Copyright; Avail: Issuing Activity

Results are reported of a preliminary investigation into the heating of plant tissue (potato, in particular) to determine whether it exhibits similar responses to heating. In comparison with animal tissue and cell culture systems, results in this study could help identify the mechanisms underlying the observed changes in dielectric properties among living systems.
Author (EI)
Animals; Cells (Biology); Heating; Plants (Botany); Reaction Kinetics; Temperature Effects; Tissues (Biology)

19960043094; 96A70724
Quantitative measurements of cerebral blood flow in volume imaging PET scanners
Smith, R. J., Univ of Pennsylvania, USA; Shao, L.; Freifelder, R.; Karp, J. S.; Ragland, J. D.; IEEE Transactions on Nuclear Science; August 1995; ISSN 0018-9499; vol. 42, no. 4, pt. 1, pp. 1018-1023; In English; Copyright; Avail: Issuing Activity

Quantitative measurements of Cerebral Blood Flow (CBF) are performed in a volume imaging PET Scanner by means of moderate activity infusions. In equilibrium infusions, activations are measured by scanning over 10 minutes with 16 minute activations. Typical measured whole brain CBF values are 37 +/- 8 ml/min/100g, close to the value of 42 ml/min/100g reported by other groups using this method. For ramped infusions, scanning over 4 minutes with 5 minute activations results in whole brain CBFs of 49 +/- 9 ml/min/100g, close to the Kety and Schmidt value of 50 ml/min/100g. Both equilibrium and ramped infusion methods have been used to study face and word memory in human subjects. Both methods were able to detect significant activations in regions implicated in human memory. We conclude that precise quantitation of regional CBF is achieved using both methods, and that ramped infusions also provide accurate measures of CBF. In addition a simplified protocol for ramped infusion studies has been developed. In this method the whole brain tissue time activity curve generated from dynamic scanning is replaced by an appropriately scaled camera coincidence countrate curve. The resulting whole brain CBF values are only 7% different from the dynamic scan and fit results. Regional CBFs (rCBF) may then be generated from the summed image (4.25 minutes) using a count density vs flow lookup table.
Author (EI)
Blood Flow; Brain Circulation; Flow Measurement; Hemodynamics; Positrons; Protocol (Computers); Tomography

19960043095; 96A70725
Positron emission mammography (PEM): a promising technique for detecting breast cancer
Thompson, C. J., McGill Univ, Canada; Murthy, K.; Picard, Y.; Weinberg, I. N.; Mako, R.; IEEE Transactions on Nuclear Science; August 1995; ISSN 0018-9499; vol. 42, no. 4, pt. 1, pp. 1012-1017; In English; Copyright; Avail: Issuing Activity

We are developing a high specificity technique for detecting the increased metabolic rate of breast tumours. The glucose analog FDG is known to concentrate in breast tumours rendering them easily detectable in conventional PET scans. Since PET is a relatively expensive imaging technique it has not been used routinely in the detection of breast cancer. Positron emission mammography (PEM) will provide a highly efficient, high spatial resolution, and low cost positron imaging system whose metabolic images are co-registered with conventional mammography. Coincidences between two BGO blocks cut into 2 x 2 mm squares coupled to two 7.5 cm square imaging PMTs are detected and back-projected to form real-time multiple plane images. The design is about 20 times more sensitive than a conventional multi-slice PET body scanner, so much less radio-pharmaceutical can be used, reducing the patient dose and cost per scan. Prototype detectors have been made and extensive measurements done. The device is expected to have an in-plane spatial resolution about 2 mm FWHM. Besides the application as a secondary screening tool the device may be beneficial in measuring a tumour's response to radio-therapy or chemo-therapy, as well as aiding the surgeon in optimizing the removal of malignant tissue.
Author (EI)
Detectors; Diseases; Mammary Glands; Metabolism; Positrons; Radiography

19960043096; 96A70726
Characteristics of a new automated blood sampling system for positron emission tomography
Eriksson, L., Karolinska Hospital/Inst, Sweden; Ingvar, M.; Rosenqvist, G.; Stone-Elander, S.; Ekdahl, T.; Kappel, P.; IEEE Transactions on Nuclear Science; August 1995; ISSN 0018-9499; vol. 42, no. 4, pt. 1, pp. 1007-1011; In English; Copyright; Avail: Issuing Activity

A new commercially available automated blood sampling system (ABSS) for positron emission tomography has been evaluated. The system uses a single BGO crystal and detects with high efficiency the annihilation radiation from tracers, labelled with positron emitting isotopes, in arterial blood. In addition the possibilities to use the ABSS as a detector in the analysis of the plasma samples with liquid chromatography techniques under flow conditions has been explored.
Author (EI)
Annihilation Reactions; Blood; Electronic Equipment; Medical Equipment; Positrons; Radiation Dosage; Single Crystals; Tomography

19960043119; 96A70749
Investigation of the count rate performance of general electric advance positron emission tomograph
Lewellen, T. K., Univ of Washington, USA; Kohlmyer, S. G.; Miyaoka, R. S.; Schubert, S.; Stearns, C. W.; IEEE Transactions on Nuclear Science; August 1995; ISSN 0018-9499; vol. 42, no. 4, pt. 1, pp. 1051-1057; In English; Copyright; Avail: Issuing Activity

A series of 2D and 3D count rate measurements have been carried out on the Advance PET system. The measurements include: NEMA standard protocols; simultaneous imaging of two small vials containing (left bracket) O-15(right bracket) water and (left bracket) F-18(right bracket); a cardiac insert placed in a water filled elliptical tank; two different head sized cylindrical tanks; and a Hoffman 3D phantom. The data were processed with and without dead time and scatter corrections. Plots were made of the total count rate, randoms, trues + scatter, scatter corrected trues, and noise equivalent count rate as a function of total activity in the machine and as the mu Ci/cc in the phantoms. The accuracy of deadtime corrections was also measured. In 2D mode, the NEMA standard protocol resulted in maximum 'trues' count rates of 540,000 cps in high sensitivity mode. In 3D mode the head sized cylindrical phantoms yielded a maximum trues rate of approximately 950,000 cps. Recovery of the water half-life was accurate with up to 50 mCi for the cardiac insert in 2D mode.
Author (EI)
Data Processing; Error Analysis; Imaging Techniques; Positrons; Protocol (Computers); Time Lag; Tomography

19960043123; 96A70753
Positron emission tomograph designed for 3/4 mm resolution
Mcintyre, J. A., Texas A&M Univ, USA; Allen, R. D.; Aguiar, J.; Paulson, J. T.; IEEE Transactions on Nuclear Science; August 1995; ISSN 0018-9499; vol. 42, no. 4, pt. 1, pp. 1102-1106; In English; Copyright; Avail: Issuing Activity

Two factors of the design for a positron tomograph affect the magnitude of the tomograph spatial resolution: the gamma ray detector width and the analogue measurement of the scintillator location. In the tomograph design reported here the analogue measurement is eliminated and the detector transaxial width factor is reduced to 3/4 mm. The analogue measurement is eliminated by transmitting the scintillation light from each individual scintillator through optical fibers to four photomultipliers (PMT's); the identities of the PMT's then provide a digital address for the scintillation location. Plastic scintillators are used to provide enough scintillation light for transmission through the optical fibers. Bonuses from the use of plastic scintillators are first, the reduction of the scintillator dead time to about 10 nsec, second, a large reduction of crosstalk between neighboring scintillators, third, the reduction of resolution loss from off-axis gamma rays and, fourth, the ability to sample the axial image at one-eighth the axial resolution distance of 2.5 mm. The designed tomograph incorporates 20 rings. Two of the 32 tomograph 20-ring modules have been constructed to measure the resolution and other characteristics of the tomograph.
Author (EI)
Gamma Rays; Light (Visible Radiation); Positrons; Radiation Detectors; Scintillation Counters; Spatial Resolution; Tomography

19960043124; 96A70754
Quantitative small field-of-view pinhole SPECT imaging: initial evaluation
Li, J., Duke Univ, USA; Jaszczak, R. J.; Coleman, R. E.; IEEE Transactions on Nuclear Science; August 1995; ISSN 0018-9499; vol. 42, no. 4, pt. 1, pp. 1109-1113; In English; Copyright; Avail: Issuing Activity

A quantitative filtered backprojection (FBP) algorithm for small field-of-view pinhole SPECT has been implemented and evaluated. This algorithm compensates for attenuation, scatter, geometric collimator response and system misalignment. Pinhole SPECT quantification with three different pinhole collimators was evaluated using experimentally acquired phantom data. SPECT scans using both in-air and in-water point sources located at different places and a cylinder filled with uniform activity were acquired. Planar scans of an in-air point source from different incident angles were acquired to determine the angular dependence of the geometric collimator response. Images were reconstructed using the FBP algorithm, with geometric response correction, dual-window scatter subtraction (c = 0.4), single iteration Chang attenuation compensation, and system misalignment correction. Total activities in point source experiments and concentrations in cylindrical phantom experiments were measured. Accurate quantitative results (less than 7%) were obtained using the pinhole FBP algorithm.
Author (EI)
Algorithms; Attenuation; Point Sources; Positrons; Scattering; Tomography

19960043131; 96A70761

Effect of scatter from radioactivity outside of the field of view in 3D PET

Sossi, V., UBC/Triumf, Canada; Barney, J. S.; Harrison, R.; Ruth, T. J.; IEEE Transactions on Nuclear Science; August 1995; ISSN 0018-9499; vol. 42, no. 4, pt. 1, pp. 1157-1161; In English; Copyright; Avail: Issuing Activity

The contribution of the scattered events originating from Radioactivity Outside the tomograph Field of View (ROFOV) is treated differently by different scatter correction algorithms. Using measured data we have evaluated the amount of scatter originating from ROFOV, its axial and transaxial distribution in two energy windows for direct and a subset of oblique planes in 3D PET. Nonuniform distributions were observed with the total contribution found to be non negligible when the amount of ROFOV was comparable to the radioactivity in the Field of View (FOV).

Author (EI)

Field of View; Positrons; Radioactivity; Tomography

19960043132; 96A70762

Object and detector scatter function dependence on energy and position in high resolution PET

Bentourkia, M., Univ of Sherbrooke, Canada; Msaki, P.; Cadorette, J.; Lecomte, R.; IEEE Transactions on Nuclear Science; August 1995; ISSN 0018-9499; vol. 42, no. 4, pt. 1, pp. 1162-1167; In English; Copyright; Avail: Issuing Activity

We have shown in previous works that distinct non-stationary analytical scatter kernels can be extracted from line source measurements and used to independently subtract object scatter and subtract or restore detector scatter in high resolution PET. In this work, the dependence of the scatter components on energy threshold and source position was investigated. Line source measurements were acquired in multispectral mode using the Sherbrooke PET simulator. Scatter parameters were extracted from data summed in energy windows with a lower threshold varying from 129 keV to 516 keV in steps of 42 keV, and a fixed upper threshold of 644 keV. Decreasing the lower threshold from 344 keV to 129 keV increases the trues by only 25%, but increases object scatter by 136% and almost triples detector scatter. A gain in efficiency by a factor of 2 or more would result from recovering the latter by restoration in the broad window. The intensity and shape of the scatter functions for both object and detector are shown to have a significant dependence on energy and position. This dependence needs to be taken into account in the design of kernels for accurate scatter correction over a broad energy range.

Author (EI)

Positrons; Radiation Detectors; Scattering; Tomography

19960043133; 96A70763

Detector efficiency and Compton scatter in fully 3D PET

Ollinger, John M., Washington Univ, USA; IEEE Transactions on Nuclear Science; August 1995; ISSN 0018-9499; vol. 42, no. 4, pt. 1, pp. 1168-1173; In English; Copyright; Avail: Issuing Activity

Variations in detector efficiency induce significant artifacts in reconstructed images unless accurate normalization methods are used. Scattered events are detected with significantly different efficiencies than unscattered events because the photons in scattered coincidences arrive at the detector at lower energies and over a wide range of angles of incidence. Current methods work well for septa-extended imaging because the scatter fractions are low. The large scatter fractions encountered in fully 3D imaging, however, require that these differences be accounted for. We propose a normalization technique that accounts for them and show that it yields more uniform images than two other potential methods.

Author (EI)

Angles (Geometry); Photons; Positrons; Radiation Detectors; Tomography

19960043134; 96A70764

Effects of scatter on model parameter estimates in 3D PET studies of the human brain

Cherry, Simon R., UCLA Sch of Medicine, USA; Huang, Sung-Cheng; IEEE Transactions on Nuclear Science; August 1995; ISSN 0018-9499; vol. 42, no. 4, pt. 1, pp. 1174-1179; In English; Copyright; Avail: Issuing Activity

The effects of scatter 3D PET projection data, reconstructed images and model parameter estimates are characterized using phantom measurements and simulation data. Scatter distributions are estimated from studies of the 3D Hoffman brain phantom by the 2D/3D difference method. Results show that the total scatter fraction in the projection data is 40%, but reduces to 27% when only those counts within the boundary of the brain are considered. After reconstruction, the whole brain scatter fraction is 20%, averaging 10% in the cortical gray matter, 21% in basal ganglia and 40% in white matter. The scatter contribution varies by almost a factor of two from the edge to the center of the brain due to the shape of the scatter distribution and the effects of attenuation correction.

Author (EI)

Blood Flow; Brain; Brain Circulation; Mathematical Models; Positrons; Scattering; Tomography

19960043135; 96A70765

Monte Carlo correction for the effect of Compton scattering in 3-D pet brain imaging

Levin, C. S., UCLA Sch of Medicine Div of Nuclear Medicine and Biophysics, USA; Dahlbom, M.; Hoffman, E. J.; IEEE Transactions on Nuclear Science; August 1995; ISSN 0018-9499; vol. 42, no. 4, pt. 1, pp. 1181-1185; In English; Copyright; Avail: Issuing Activity

A Monte Carlo simulation has been developed to simulate and correct for the effect of Compton scatter in 3-D

acquired PET brain scans. The method utilizes the 3-D reconstructed image volume as the source intensity distribution for a photon-tracking Monte Carlo simulation. It is assumed that the number of events in each pixel of the image represents the isotope concentration at that location in the brain. The history of each annihilation photon's interactions in the scattering medium is followed, and the sinograms for the scattered and unscattered photon pairs are generated in a simulated 3-D PET acquisition. The calculated scatter contribution is used to correct the original data set. The method is general and can be applied to any scanner configuration or geometry. In its current form the simulation requires 25 hours on a single Sparc 10 CPU when every pixel in a 15-plane, 128 x 128 pixel image volume is sampled, and less than 2 hours when 16 pixels (4 x 4) are grouped as a single pixel. Results of the correction applied to 3-D human and phantom studies are presented.
Author (EI)
Brain; Compton Effect; Computerized Simulation; Electron Scattering; Gantry Cranes; Imaging Techniques; Light Scattering; Monte Carlo Method; Positrons; Tomography

19960043140; 96A70770
Combination of Wiener filtering and singular value decomposition filtering for volume imaging PET
Shao, Lingxiong, Univ of Pennsylvania, USA; Lewitt, Robert M.; Karp, Joel S.; Muehllehner, Gerd; IEEE Transactions on Nuclear Science; August 1995; ISSN 0018-9499; vol. 42, no. 4, pt. 1, pp. 1228-1234; In English; Copyright; Avail: Issuing Activity

This paper combines the use of Wiener filter (WF) with the singular value decomposition (SVD) to decrease the noise and improve the image quality. The SVD filtering 'deconvolves' the spatially variant axial response function while the WF suppresses the noise and reduces the blurring not modeled by the axial SVD filter but included in the system modulation transfer function. This combined filter is evaluated in terms of spatial resolution, image contrast, and signal-to-noise ratio with several phantom. Specifically, both SVD filter with an axial Wiener filter and the SVD filter with a 3D Wiener filter are studied and compared the filtered images to those from the 3D reprojection (3DRP) reconstruction algorithm.
Author (EI)
Algorithms; Field of View; Image Contrast; Image Reconstruction; Image Resolution; Imaging Techniques; Positrons; Signal Processing; Tomography; Wiener Filtering

19960043141; 96A70771
Optimal data replication: a new approach to optimizing parallel EM algorithms on a mesh-connected multiprocessor for 3D PET image reconstruction
Chen, Chung-Ming, Natl Taiwan Univ, USA; Lee, Soo-Young; IEEE Transactions on Nuclear Science; August 1995; ISSN 0018-9499; vol. 42, no. 4, pt. 1, pp. 1235-1245; In English; Copyright; Avail: Issuing Activity

The EM algorithm promises an estimated image with the maximal likelihood for 3D PET image reconstruction. However, due to its long computation time, the EM algorithm has not been widely used in practice. While several parallel implementations of the EM algorithm have been developed to make the EM algorithm feasible, they do not guarantee an optimal parallelization efficiency. In this paper, we propose a new parallel EM algorithm which maximizes the performance by optimizing data replication on a mesh-connected message-passing multiprocessor. To optimize data replication, we have formally derived the optimal allocation of shared data, group sizes, integration and broadcasting of replicated data as well as the scheduling of shared data accesses. The proposed parallel EM algorithm has been implemented on an iPSC/860 with 16 PEs. The experimental and theoretical results, which are consistent with each other, have shown that the proposed parallel EM algorithm could improve performance substantially over those using unoptimized data replication.
Author (EI)
Algorithms; Image Reconstruction; Positrons; Tomography

19960043155; 96A70785
Measurement of positron range in matter in strong magnetic fields
Hammer, Bruce E., Univ of Minnesota, USA; Christensen, Nelson L.; IEEE Transactions on Nuclear Science; August 1995; ISSN 0018-9499; vol. 42, no. 4, pt. 1, pp. 1371-1376; In English; Copyright; Avail: Issuing Activity

Positron range is one factor that places a limitation on Positron Emission Tomography (PET) resolution. The distance a positron travels through matter before it annihilates with an electron is a function of its initial energy and the electron density of the medium. A strong magnetic field limits position range when momentum components are transverse to the field. Measurement of positron range was determined by deconvolving the effects of detector response and radioactivity distribution from the measured annihilation spread function. The annihilation spread function for a 0.5 mm bead of (sup 68)Ga was measured with 0.2 and 1.0 mm wide slit collimators. Based on the annihilation spread function FWHM (Full Width at Half Maximum) for a 1.0 mm wide slit the median positron range in tissue equivalent materials is 0.87, 0.50. 0.22 mm at 0, 5.0 and 9.4 T, respectively.
Author (EI)
Annihilation Reactions; Carrier Density (Solid State); Electrons; Magnetic Effects; Positron Annihilation; Positrons; Tomography

19960043164; 96A70794
Development of skin surface radiation detector system to monitor radioactivity in arterial blood along with positron emission tomography
Watabe, Hiroshi, Natl Cardiovascular Cent Research Inst, Japan; Miyake, Masayasu; Narita, Yuichirou; Nakamura,

Takashi; Itoh, Masatoshi; IEEE Transactions on Nuclear Science; August 1995; ISSN 0018-9499; vol. 42, no. 4, pt. 2, pp. 1455-1459; In English; Copyright; Avail: Issuing Activity

A noninvasive blood radioactivity monitor system for Positron Emission Tomography (PET) study has been developed. This system has dual plastic scintillators to detect positrons from the wrist artery. One is for monitoring the blood radioactivity in artery and tissue, and another is for monitoring only in tissue, in order to subtract background radiation from tissue. We carried out phantom experiments for evaluating basic characteristics of this monitor system. Clinical experiments using (sup 15)O-labeled water were also done to compare this system with a conventional invasive monitor.
Author (EI)
Blood; Blood Flow; Brain Circulation; Phosphors; Positrons; Radiation Detectors; Tomography

19960044105; 96A71735
Detectability in nuclear medicine images by a random-dot model: a theoretical analysis
Yamada, Isao, Gifu Coll of Medical Technology, Japan; Tanaka, Kazuo; Applied Optics; May 10 1994; ISSN 0003-6935; vol. 33, no. 14, pp. 2900-2908; In English; Copyright; Avail: Issuing Activity

This paper presents a theoretical analysis of the steps of recording and observation of medical images which are constructed by a small number of photons. Two cases of simulation of the observation procedure are evaluated. In one the observer compares the signal amplitude at the center of the image while the background noise amplitude is at a point far away from the signal. The other simulation concerns image difference across the boundary between signal and background noise. The theoretical detectabilities of the computer-generated random-dot pattern images is calculated. The receiver operating characteristics (ROC) curve analysis is used for analysis of visual detectability. Results show that the proposed signal-conditioning random dot model is applicable to analysis of low-light image signal-detection problems.
Author (EI)
Imaging Techniques; Mathematical Models; Medical Equipment; Nuclear Medicine

52
AEROSPACE MEDICINE

Includes physiological factors; biological effects of radiation; and effects of weightlessness on man and animals.

19960037368; 96A67061
A late ventricular potentials detection algorithm based on the use of 12 ECG leads
Kravchenko, V. F.; Popov, A. YU.; Pustovojt, V. I.; Radiotekhnika i Elektronika; May 1995; ISSN 0033-8494; vol. 40, no. 5, pp. 830-837; In Russian; Copyright; Avail: Issuing Activity

An algorithm is suggested for detection of late ventricular potentials of a heart that is based on registration of six standard and six chest ECG leads. To compare results obtained by the suggested methods and Simson method the curve Vector Magnitude is computed by restoration of bipolar orthogonal leads from standard and chest ones what allows to carry out analysis of the late potentials presence on the basis of standard criteria.
Author (EI)
Bioelectric Potential; Bioengineering; Cardiology; Electrocardiography; Maximum Principle

19960038095; 96A67788
Localization uncertainty in area-based stereo algorithms
Voelpel, B., Ruhr-Universitaet, Germany; Theimer, W. M.; IEEE Transactions on Systems, Man and Cybernetics; December 1995; ISSN 0018-9472; vol. 25, no. 12, pp. 1628-1634; In English; Copyright; Avail: Issuing Activity

A theory for treating uncertainty in localizing 3D objects using local, area-based stereo algorithms is presented. In addition, the resultant implications for practical applications are discussed. First, we propose a phase-based stereo algorithm as a representative of this kind of algorithms. The concept of a receptive field is introduced to describe a region on the target where stimuli with fixed disparity but variable position in the receptive field yield the same disparity response. This positional uncertainty on the targets is transformed into a localization uncertainty existing in the world. Strategies for optimally localizing 3D structure are developed. These considerations also lead to an upper bound for the vergence angle and a fusion strategy for multiple views when employing an active stereo camera system. Finally we show the validity of our approach by experimental results.
Author (EI)
Algorithms; Cameras; Position (Location); Stereoscopic Vision; Video Signals

19960038477; 96N30943 Istituto Superiore di Sanita, Rome, Italy
Guidelines of the Italian CCTN for the classification of some effects of chemical substances
Mucci, N., Editor, Istituto Superiore di Sanita, Italy; Camoni, I., Editor, Istituto Superiore di Sanita, Italy; 1996; ISSN 0394-9311; 34p; In English
Report No.(s): 96/2 EN; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

In 1987 the CCTN produced a report entitled 'Guidelines for the evaluation of the toxic effects of chemical compounds. Part 1: carcinogenic, mutagenic and teratogenic effects' and, in 1990, 'Part 2: other toxic effects'. The present report constitutes an update of the first part, rendered necessary by the fact that the CCTN, in 1994, has varied the definitions of the cate-

gories of carcinogenesis, mutagenesis and teratogenesis and has partially modified also the criteria for the classification of substances into these categories. Such modifications were thought to be appropriate for the inclusion of new concepts and scientific data as well as to render comparable the classifications carried out by the CCTN with those carried out by the EU. Regarding the first point, for example, the classification of chemical substances for teratogenic effects, already extended to embryo-toxic effects, has been further enlarged to include toxic effects on reproduction, These last includes both effects on the unborn child (as considered in the previous classification system) as well as effects on male and female fertility, as suggested by several studies effected in this field. An analogous procedure has been carried out by the EU.
Derived from text
Carcinogens; Classifications; Mutagens; Fertility; Embryos; Public Health; Toxic Hazards; Risk

19960038690; 96N30962 Iowa Univ., Iowa City, IA USA
In vitro thermosensitivity of the midline thalamus
Travis, Kathleen A., Iowa Univ., USA; Bockholt, H. Jeremy, Iowa Univ., USA; Zardetto-Smith, Andrea M., Iowa Univ., USA; Mar. 21, 1995; ISSN 0006-8993; 10p; Repr. from Brain Research (Elsevier Science B.V.) v. 686, 1995 p 17-22; In English
Contract(s)/Grant(s): NAGW-4358; HL14388; HL33447; HL44546; ASAMHA NRSA DA05429; NIH NRSA HL08442
Report No.(s): NASA-CR-201816; NAS 1.26:201816; Copyright Waived (NASA); Avail: CASI; A02, Hardcopy; A01, Microfiche

This study compared the thermosensitivity and spontaneous activity of thatamic midline neurons with those of neurons in areas widely regarded to be involved in thermoregulation (preoptic/anterior hypothalamus and posterior hypothalamus). In vitro single unit recordings were made from neurons within the thalamic midline nuclei, the preoptic/anterior hypothalamus and posterior hypothalamus prior to and during a temperature change 3-7 C above and below 37 C. There were no significant differences in the degree of thermosensitivity or the proportion of thermosensitive neurons in the three areas. In each area examined, the thermosensitive neurons had a spontaneous activity which was significantly greater than that of the temperature-insensitive neurons. The results suggest that structures of the midline thalamus may play a role similar to that of the preoptic/anterior hypothalamus and posterior hypothalamus in the processing of temperature related information.
Author
Neurons; Thalamus; Thermoregulation; Electrophysiology; Neurophysiology; Hypothalamus

19960038710; 96N30981 Scripps Clinic and Research Foundation, La Jolla, CA USA
An Epidemiologic Investigation of Health Effects in Air Force Personnel Following Exposure to Herbicides. Volume 3
Grubbe, William D., Science Applications International Corp., USA; Wolfe, William H., Armstrong Lab., USA; Michalek, Joe E., Armstrong Lab., USA; Williams, David E., Scripps Clinic and Research Foundation, USA; Lustik, Michael B., Science Applications International Corp., USA; Brockman, A. S., Science Applications International Corp., USA; Henderson, S. C., Science Applications International Corp., USA; Burnett, M. S., Science Applications International Corp., USA; Land, R. G., Science Applications International Corp., USA; Osborne, D. J., Science Applications International Corp., USA; Rocconi, B. S., Science Applications International Corp., USA; Shrieberg, M. E., Science Applications International Corp., USA; Miner, J. C., Armstrong Lab., USA; Henriksen, G. L., Armstrong Lab., USA; Swaby, J. A., Armstrong Lab., USA; May 02, 1995; 522p; In English
Contract(s)/Grant(s): F41624-91-C-1006
Report No.(s): AD-A304312; AL-TR-920107-VOL-3; No Copyright; Avail: CASI; A22, Hardcopy; A04, Microfiche

Partial Contents: Summary of Previous Analyses of the Air Force Health Study, 1982 Baseline Study Summary Results, 1985 Followup Study Summary Results, 1987 Followup Study Summary Results, Serum Dioxin Analysis of 1987 Followup Study, Summary Results, Parameters of the Psychological Assessment, Dependent Variables, Medical Records Data, Physical Examination Data, Covariates, Statistical Methods, Dependent Variable-Covariate Associations, Exposure Analysis, Verified Medical Records Variables Psychoses, Alcohol Dependence, Drug Dependence Anxiety, Other Neuroses, Psychological Examination Variables, SCL-9O-R Anxiety SCL-90-R Depression SCL-90-R Hostility, SCL-90-R Interpersonal Sensitivity SCL-9O-R Obsessive-Compulsive Behavior, SCL-90-R Paranoid Ideation SCL-90-R Phobic Anxiety, SCL-9O-R Psychoticism, SCL-90-R Somatization SCL-9O-R Global Severity Index, SCL-90-R Positive Symptom Total SCL-9O-R Positive Symptom Distress Index.
DTIC
Public Health; Personnel; Armed Forces (USA); Physical Examinations

19960038712; 96N30983 Science Applications International Corp., McLean, VA USA
An Epidemiologic Investigation of Health Effects in Air Force Personnel Following Exposure to Herbicides. Volume 1 ***Interim Report***
Grubbs, William D., Science Applications International Corp., USA; Wolfe, Willam H., Armstrong Lab., USA; Michalek, Joel E., Armstrong Lab., USA; Williams, David E,

Scripps Clinic and Research Foundation, USA; Lustik, Michael B., Science Applications International Corp., USA; May 02, 1995; 335p; In English
Contract(s)/Grant(s): F41624-91-C-1006
Report No.(s): AD-A304306; AL-TR-920107-VOL-1; No Copyright; Avail: CASI; A15, Hardcopy; A03, Microfiche

This report represents the results from an epidemiologic study to determine whether adverse health effects attributable to Herbicide Orange exist in Vietnam veterans who participated in Operation Ranch Hand. Data were analyzed for 12 clinical areas. The analysis focused on group differences between the exposed (Ranch Hand) and unexposed (Comparison) cohorts, as well as on the association of each health-related endpoint with extrapolated initial and current serum dioxin levels. Findings in this report reveal a consistent relationship between dioxin and body fat that was initially noted in the analysis of the 1987 examination results. Cholesterol and the cholesterol to HDL ratio were found to be associated with current serum dioxin levels. Evidence for a possible association between glucose intolerance, impaired insulin production, and dioxin exposure was revealed, but cause and effect remain to be established. Also revealed was a significant association between selected peripheral pulses and dioxin exposure, and a significant difference in self-perceived health status between Ranch Hands and Comparisons (although possible due to bias). Other health endpoints revealed no consistent patterns within or across clinical areas that were suggestive of health detriment due to dioxin exposure.
DTIC
Clinical Medicine; Public Health; Medical Services; Personnel

19960039014; 96A68087
Determining the aspect ratio of a CCD camera
Lee, Jiann-Der, Chang Gung Coll of Medicine and Technology, Tao-Yuan, Taiwan, USA; Electronics Letters; October 12 1995; ISSN 0013-5194; vol. 31, no. 21, pp. 1820-1821; In English; Copyright; Avail: Issuing Activity

The aspect ratio is an essential parameter of a camera. It is the ratio of the distances between two adjacent pixels in the frame buffer along the horizontal and vertical directions, respectively. A simple and fast method is proposed for calculating the aspect ratio using a trihedral normal angle. The focal length can also be derived. Neither nonlinear equations nor iterative procedures are used in this approach, and therefore the calculating procedure is analytic and easy to implement.
Author (EI)
Aspect Ratio; Cameras; Charge Coupled Devices; Computer Vision; Three Dimensional Motion; Vectors (Mathematics)

19960039764; 96A68837
Implementing responsible care
Lee, Betty Lou, Cerdec Corp, USA; Ceramic Engineering and Science Proceedings; May 1995; ISSN 0196-6219; vol. 16, no. 3, pp. 134-136; In English; Copyright; Avail: Issuing Activity

The Responsible Care concept which was developed in Canada and quickly adopted by the U.S. Chemical Manufacturers Association in the late 1980s is now a worldwide chemical industry initiative. by implementing this concept, Cerdec Corporation is able to design, manufacture, and distribute its products in a manner that assures the protection of the environment and the health and safety of its employees, customers, and the general public as well.
Author (EI)
Accident Prevention; Health; Industries; Manufacturing

19960039888; 96N31044 Iowa Univ., Depts. of Psychology, Internal Medicine and the Cardiovascular Center. College of Medicine., Iowa City, IA USA
Mechanisms of insulin action on sympathetic nerve activity
Muntzel, Martin S., Iowa Univ., USA; Anderson, Erling A., Iowa Univ., USA; Johnson, Alan Kim, Iowa Univ., USA; Mark, Allyn L., Iowa Univ., USA; 1996; 12p; Repr. from Clinial and Experimental Hypertension (Marcel Dekker, Inc.), v. 17, no. 1&2, 1995 p 39-50; In English
Contract(s)/Grant(s): NAGW-4358; HL-08704; HL-14338; HL-44546
Report No.(s): NASA-CR-201815; NAS 1.26:201815; Copyright Waived (NASA); Avail: CASI; A03, Hardcopy; A01, Microfiche

Insulin resistance and hyperinsulinemia may contribute to the development of arterial hypertension. Although insulin may elevate arterial pressure, in part, through activation of the sympathetic nervous system, the sites and mechanisms of insulin-induced sympathetic excitation remain uncertain. While sympathoexcitation during insulin may be mediated by the baroreflex, or by modulation of norepinephrine release from sympathetic nerve endings, it has been shown repeatedly that insulin increases sympathetic outflow by actions on the central nervous system. Previous studies employing norepinephrine turnover have suggested that insulin causes sympathoexcitation by acting in the hypothalamus. Recent experiments from our laboratory involving direct measurements of regional sympathetic nerve activity have provided further evidence that insulin acts in the central nervous system. For example, administration of insulin into the third cerebralventricle increased lumbar but not renal or adrenal sympathetic nerve activity in normotensive rats. Interestingly, this pattern of regional sympathetic nerve responses to central neural administration of insulin is similar to that seen with systemic administration of insulin. Further, lesions of the anteroventral third ventricle hypothalamic (AV3V) region abolished increases in sympathetic activity to systemic administration of insulin with euglycemic clamp, suggesting

that AV3V-related structures are critical for insulin-induced elevations in sympathetic outflow.
Author
Central Nervous System; Insulin; Sympathetic Nervous System; Norepinephrine; Hypertension; Hypothalamus; Excitation

19960039921; 96N31075 Naval Medical Research Inst., Bethesda, MD USA
Lipid peroxidation following in vitro and in vivo O2 exposures, *Nov. 1992- Nov. 1994*
Harabin, A. L., Naval Medical Research and Development Command, USA; Braisted, J. C., Naval Medical Research and Development Command, USA; Nov. 1995; 34p; In English
Contract(s)/Grant(s): M00099
Report No.(s): AD-A304896; NMRI-95-79; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Four indices of lipid peroxidation were studied in rat brain, lung, and plasma to determine if these would be useful markers of progressive oxidative damage. Conjugated dienes, thiobarbituric acid reac tive substances, and water and lipid soluble fluorescent products were measured following IN vitro and in vivo O2 exposures. For in vitro studies, homogenized tissues were oxidized non-enzymatically in increasing amounts of O2. For in vivo studies, rats were exposed to normobaric or hyperbaric O2 for a range of times and pressures. In vitro, all 4 indices increased with PO2 of exposure: brain > lung > plasma. In vivo exposures resulted in lower levels than those achieved in vitro. Hyperbaric exposure produced higher levels than normobaric exposures, but fairly long duration and/or high P02 exposures were required for increases in tissues. On the other hand, plasma thiobarbituric acid reactive substances increased after only 6 h of normobaric 02 exposure and remained elevated. Brain lipid peroxidation was detected following normobaric 02, giving evidence of non-pulmonary oxidation. These results show that there is a relationship between severity of O2 exposure and level of lipid peroxidation, but suggest that other markers should also be investigated for earlier changes.
DTIC
Lipids; Plasmas (Physics); Brain; Lungs; Rats; Oxidation; Fluorescence; Oxygen; Dienes

19960040737; 96A69612
Dynamic numerical method for models of the urine concentrating mechanism
Layton, H. E., Duke Univ, USA; Pitman, E. Bruce; Knepper, Mark A.; SIAM Journal on Applied Mathematics; October 1995; ISSN 0036-1399; vol. 55, no. 5, pp. 1390-1418; In English; Copyright; Avail: Issuing Activity

Dynamic models of the urine concentrating mechanism consist of large systems of hyperbolic partial differential equations, with stiff source terms, coupled with fluid conservation relations. Efforts to solve these equations numerically with explicit methods have been frustrated by numerical instability and by long computation times. As a consequence, most models have been reformulated as steady-state boundary value problems, which have usually been solved by an adaptation of Newton's method. Nonetheless, difficulties arise in finding conditions that lead to stable convergence, especially when the very large membrane permeabilities measured in experiments are used. In this report, an explicit method, previously introduced to solve the model equations of a single renal tubule, is extended to solve a large-scale model of the urine concentrating mechanism. This explicit method tracks concentration profiles in the upwind direction and thereby avoids instability arising from flow reversal. To attain second-order convergence in space and time, the recently developed ENO (essentially non-oscillatory) methodology is implemented. The method described here, which has been rendered practical for renal models by the emergence of desktop workstations, is adaptable to various medullary geometries and permits the inclusion of experimentally measured permeabilities. This report describes an implementation of the method, makes comparisons with results obtained previously by a different method, and presents an example calculation using some recently measured membrane properties.
Author (EI)
Body Fluids; Boundary Value Problems; Computation; Fluid Dynamics; Mathematical Models; Partial Differential Equations

19960041530; 96N31464 Iowa Univ., Depts. of Psychology and Pharmacology and the Cardiovascular Center., Iowa City, IA USA
Effects of lidocaine injections into the lateral parabrachial nucleus on dipsogenic and pressor response to central angiotensin 2 in rats
Menani, Jose Vanderlei, Iowa Univ., USA; Beltz, Terry G., Iowa Univ., USA; Jun. 28, 1995; ISSN 0006-8993; 8p; Repr. from Brain Research (Elsevier Science B. V.) v. 695, 1995 p 250-252; In English
Contract(s)/Grant(s): NAGW-4358; HL-14338; HL-44546; 93/0167-7
Report No.(s): NASA-CR-201817; NAS 1.26:201817; Copyright Waived (NASA); Avail: CASI; A02, Hardcopy; A01, Microfiche

This study investigated the effects of bilateral injections of the local anesthetic, lidocaine, into the lateral parabrachial nucleus (LPBN) on the dipsogenic and pressor responses induced by intracerebroventricular (i.c.v.) injection of angiotensin 2 (ANG 2). Centrally injected ANG 2 (50 ng/1 microliter) induced water intake (IO.2 +/- 0.8 ml/h) and pressor responses (22 +/- 1 mmHg). Prior bilateral injection of 10% lidocaine (200 nl) into the LPBN increased the water intake (14.2 +/- 1.4 ml/h), but did not change the pressor response (17 +/- 1 mmHg) to i.c.v. ANG 2. Lidocaine alone injected into the LPBN also induced a pressor response (23 +/- 3

mmHg). These results showing that bilateral LPBN injection of lidocaine increase water intake induced bv i.c.v. ANG 2 are consistent with electrolytic and neurotoxic lesion studies and suggest that the LPBN is associated with inhibitory mechanisms controlling water intake induced by ANG 2. These results also provide evidence that it is feasible to reversibly anesthetize this brain area to facilitate fluid-related ingestive behavior.
Author
Neurophysiology; Drinking; Brain; Blood Pressure

19960044044; 96A71674
Optimal camera geometry and performance analysis of a trinocular vision system
Chiou, R. N., Southern Taiwan Telecommunication Administration, Kaohsiung, Taiwan, USA; Chen, C. H.; Hung, K. C.; Lee, J. Y.; IEEE Transactions on Systems, Man and Cybernetics; August 1995; ISSN 0018-9472; vol. 25, no. 8, pp. 1207-1220; In English; Copyright; Avail: Issuing Activity

The projection location constraint is exploited to reduce ambiguous correspondences in trinocular vision systems. The inherent matching problems associated with the spurious features produced by overlapping among targets, the periodic structure of objects and the occlusion features were solved. The projection location constraint can be achieved by the deviation-to-distance transformation and the optimal epipolar constraint. In practice, the method allows a very easy adjustment of camera geometry to simplify the most troublesome matching problem encountered in stereo systems.
Author (EI)
Cameras; Image Reconstruction; Position (Location); Problem Solving; Stereoscopic Vision; Transformations (Mathematics); Video Signals

53
BEHAVIORAL SCIENCES

Includes psychological factors; individual and group behavior; crew training and evaluation; and psychiatric research.

19960040733; 96A69608
Strategy of knowledge representation for uncertain problems: Modeling domain expert knowledge with patterns
Vamos, Tibor, Hungarian Acad of Sciences, Hungary; IEEE Transactions on Systems, Man and Cybernetics; October 1995; ISSN 0018-9472; vol. 25, no. 10, pp. 1365-1370; In English; Copyright; Avail: Issuing Activity

Patterns as sets of somehow coherent information are feasible metaphors and tools for representation of weakly structured or unstructured knowledge in an open, infinite world. This view follows the evolutionary theory of mind representation. A practical computational formulation is given with pattern relationships based on the metapattern concept. The pattern space is mostly nonmetric due to the limited dimensional view of infinite dimensional objects. The faults of the metric suggest directions in exploring further knowledge and eliciting tacit knowledge of experts. Man-machine interaction has a special role in the process, explored by cognitive psychology methods and special graphic tools for input-output representation.
Author (EI)
Cognition; Cognitive Psychology; Computation; Human-Computer Interface; Knowledge Representation

Subject Term Index

A

ACCIDENT PREVENTION, 10
ADHESION, 2
ALGORITHMS, 1, 5, 7, 8
ALLUVIUM, 3
ANGLE OF ATTACK, 2
ANGLES (GEOMETRY), 6
ANIMALS, 4
ANNIHILATION REACTIONS, 5, 7
ANTIGENS, 1
AQUIFERS, 3
ARMED FORCES (UNITED STATES), 9
ASPECT RATIO, 10
ATTENUATION, 5

B

BACTERIA, 3
BENDING VIBRATION, 1
BIOELECTRIC POTENTIAL, 2, 8
BIOELECTRICITY, 2
BIOENGINEERING, 1, 3, 8
BIOLOGY, 2
BIOTIN, 4
BLOOD, 5, 8
BLOOD FLOW, 4, 6, 8
BLOOD PRESSURE, 12
BODY FLUIDS, 11
BONES, 1
BOUNDARY VALUE PROBLEMS, 11
BRAIN, 2, 6, 7, 11, 12
BRAIN CIRCULATION, 4, 6, 8

C

CALCIUM PHOSPHATES, 3
CAMERAS, 8, 10, 12
CARCINOGENS, 9
CARDIOLOGY, 2, 8
CARDIOVASCULAR SYSTEM, 2
CARRIER DENSITY (SOLID STATE), 7
CELLS (BIOLOGY), 4
CENTRAL NERVOUS SYSTEM, 11
CHARGE COUPLED DEVICES, 10
CHROMOPHORES, 3
CLASSIFICATIONS, 9
CLINICAL MEDICINE, 10
COGNITION, 12
COGNITIVE PSYCHOLOGY, 12
COMPOSITION (PROPERTY), 2
COMPTON EFFECT, 7
COMPUTATION, 11, 12
COMPUTATIONAL FLUID DYNAMICS, 1
COMPUTER VISION, 10
COMPUTERIZED SIMULATION, 7
COVALENCE, 3

D

DATA PROCESSING, 5
DEGRADATION, 3
DESORPTION, 4
DETECTORS, 4
DIENES, 11
DISEASES, 4
DRINKING, 12

E

ELECTROCARDIOGRAPHY, 8
ELECTROENCEPHALOGRAPHY, 2
ELECTRON SCATTERING, 7
ELECTRONIC EQUIPMENT, 5
ELECTRONS, 7
ELECTROPHYSIOLOGY, 2, 9
EMBRYOS, 9
ERROR ANALYSIS, 5
EVALUATION, 3
EXCITATION, 11
EXTREMELY HIGH FREQUENCIES, 2

F

FERTILITY, 9
FIELD OF VIEW, 6, 7
FLOW MEASUREMENT, 4
FLUID DYNAMICS, 11
FLUORESCENCE, 11
FREQUENCY DISTRIBUTION, 1
FREQUENCY MEASUREMENT, 1

G

GAMMA RAYS, 5
GANTRY CRANES, 7
GASES, 3

H

HEALTH, 10
HEART VALVES, 1
HEAT TREATMENT, 3
HEATING, 4
HEMODYNAMICS, 4
HUMAN-COMPUTER INTERFACE, 12
HYDROGEN, 3
HYPERTENSION, 11
HYPOTHALAMUS, 9, 11

I

IMAGE CONTRAST, 7
IMAGE RECONSTRUCTION, 1, 7, 12
IMAGE RESOLUTION, 7
IMAGING TECHNIQUES, 1, 5, 7, 8
IMMUNOLOGY, 1
INDUSTRIES, 10
INJECTION, 3
INSULIN, 11

K

KNOWLEDGE REPRESENTATION, 12

L

LASER ABLATION, 4
LIGHT (VISIBLE RADIATION), 5
LIGHT SCATTERING, 7
LIPIDS, 11
LUNGS, 11

M

MAGNETIC EFFECTS, 7
MAGNETIC FIELDS, 2
MAMMARY GLANDS, 4
MANUFACTURING, 10
MASS, 3
MASS SPECTROSCOPY, 4
MATHEMATICAL MODELS, 6, 8, 11
MAXIMUM PRINCIPLE, 8
MEDICAL EQUIPMENT, 1, 5, 8
MEDICAL SERVICES, 10
METABOLISM, 4
MICROANALYSIS, 4

MICROWAVE IMAGERY, 1
MICROWAVES, 2
MILLIMETER WAVES, 2
MIXTURES, 3
MONTE CARLO METHOD, 7
MUTAGENS, 9

N

NEURONS, 9
NEUROPHYSIOLOGY, 2, 9, 12
NOREPINEPHRINE, 11
NUCLEAR MEDICINE, 8

O

ORGANS, 1
ORTHOPEDICS, 3
OXIDATION, 11
OXYGEN, 11

P

PARTIAL DIFFERENTIAL EQUATIONS, 11
PERSONNEL, 9, 10
PHASE VELOCITY, 1
PHOSPHORS, 8
PHOTOIONIZATION, 4
PHOTONS, 6
PHYSICAL EXAMINATIONS, 9
PLANTS (BOTANY), 4
PLASMAS (PHYSICS), 11
POINT SOURCES, 5
POSITION (LOCATION), 8, 12
POSITRON ANNIHILATION, 7
POSITRONS, 4, 5, 6, 7, 8
PROBLEM SOLVING, 12
PROTEINS, 1, 3
PROTOCOL (COMPUTERS), 4, 5
PUBLIC HEALTH, 9, 10

R

RADIATION DETECTORS, 5, 6, 8
RADIATION DOSAGE, 5
RADIATION EFFECTS, 2
RADIOACTIVITY, 6
RADIOGRAPHY, 4
RADIOMETERS, 2
RATS, 11
REACTION KINETICS, 4
RISK, 9

S

SCATTERING, 5, 6
SCINTILLATION COUNTERS, 5
SIGNAL PROCESSING, 7
SILICA GEL, 3
SINGLE CRYSTALS, 5
SPATIAL RESOLUTION, 5
STABILITY, 3
STEREOSCOPIC VISION, 8, 12
SYMPATHETIC NERVOUS SYSTEM, 11

T

TEMPERATURE EFFECTS, 4
THALAMUS, 9
THERMOREGULATION, 9
THREE DIMENSIONAL MOTION, 10
TIME LAG, 5
TISSUES (BIOLOGY), 4
TOMOGRAPHY, 4, 5, 6, 7, 8
TOXIC HAZARDS, 9
TRANSFORMATIONS (MATHEMATICS), 12

U

ULTRASONIC TESTS, 1

V

VECTORS (MATHEMATICS), 10
VELOCITY MEASUREMENT, 1
VIDEO SIGNALS, 8, 12

W

WEAR, 2
WIENER FILTERING, 7

X

X RAY DIFFRACTION, 2

Personal Author Index

A

Aguiar, J., 5
Allen, R. D., 5
Anderson, Erling A., 10
Anderson, Lamont K., 2
ANON, 1

B

Barney, J. S., 6
Beltz, Terry G., 11
Bentourkia, M., 6
Bockholt, H. Jeremy, 9
Bodakian, B., 4
Braisted, J. C., 11
Brockman, A. S., 9
Burnett, M. S., 9

C

Cadorette, J., 6
Camoni, I., 8
Chen, B.–C., 2
Chen, C. H., 12
Chen, Chung–Ming, 7
Chen, Dapeng, 1
Cherry, Simon R., 6
Chiou, R. N., 12
Cho, S.–B., 3
Christensen, Nelson L., 7
Chubachi, N., 1
Coleman, R. E., 5

D

Dahlbom, M., 6
Doi, Tatsuya, 2

E

Ekdahl, T., 4
Elkin, V. A., 2
Eriksson, L., 4
Evstigneeva, R. S., 1

F

Freifelder, R., 4

G

Grigor, 1
Grubbe, William D., 9
Grubbs, William D., 9
Gulyaev, Yu. V., 2

H

Hammer, Bruce E., 7
Hanley, Luke, 3
Harabin, A. L., 11
Harrison, R., 6
Hart, F. X., 4
Hayano, Seiji, 2
Henderson, S. C., 9
Henriksen, G. L., 9
Hoffman, E. J., 6
Huang, Sung–Cheng, 6
Hung, K. C., 12

I

Ingvar, M., 4
Iramina, Keiji, 2
Itoh, Masatoshi, 8

J

Jaszczak, R. J., 5
Johnson, Alan Kim, 10

K

Kanai, H., 1
Kappel, P., 4
Karp, J. S., 4
Karp, Joel S., 7
Kitsugi, T., 3
Knepper, Mark A., 11
Kohlmyer, S. G., 5
Kokubo, T., 3
Kravchenko, V. F., 8

L

Land, R. G., 9
Layton, H. E., 11
Lecomte, R., 6
Lee, Betty Lou, 10
Lee, J. Y., 12
Lee, Jiann–Der, 10
Lee, Soo–Young, 7
Levin, C. S., 6
Lewellen, T. K., 5
Lewitt, Robert M., 7
Li, J., 5
Lustik, Michael B., 9, 10
Lykke, Keith R., 3

M

Mako, R., 4
Mark, Allyn L., 10
Mcintyre, J. A., 5
Menani, Jose Vanderlei, 11
Michalek, Joe E., 9
Michalek, Joel E., 9
Miner, J. C., 9
Miyake, Masayasu, 7
Miyaoka, R. S., 5
Msaki, P., 6
Mucci, N., 8
Muehllehner, Gerd, 7
Muntzel, Martin S., 10
Murthy, K., 4

N

Nakamura, T., 3
Nakamura, Takashi, 7
Nakanishi, K., 3
Narita, Yuichirou, 7
Niyazmatov, A. A., 1

O

Odenthal, Paul J., 3
Ohtsuki, CH., 3
Ollinger, John M., 6
Osborne, D. J., 9

P

Park, M., 1
Paulson, J. T., 5
Pellin, Michael J., 3
Petrosyan, V. I., 2
Picard, Y., 4
Pitman, E. Bruce, 11
Popov, A. YU., 8
Prokuronova, E. I., 1
Pustovojt, V. I., 8

R

Ragland, J. D., 4
Ren, L.–Q., 2
Rocconi, B. S., 9
Rosenqvist, G., 4
Ruth, T. J., 6

S

Saito, Yoshifuru, 2
Schubert, S., 5
Shao, L., 4
Shao, Lingxiong, 7
Shrieberg, M. E., 9
Sinitsyn, N. I., 2
Smith, R. J., 4
Soga, N., 3
Sossi, V., 6
Stearns, C. W., 5
Stone–Elander, S., 4
Swaby, J. A., 9

T

Tanaka, Kazuo, 8
Theimer, W. M., 8
Thompson, C. J., 4
Tong, J., 2
Travis, Kathleen A., 9
Trevor, Jennifer L., 3

U

Ueno, Kenichi, 2
Ueno, Shoogo, 2

V

Vamos, Tibor, 12
Voelpel, B., 8

W

Watabe, Hiroshi, 7
Weinberg, I. N., 4
Williams, David E, 9
Williams, David E., 9
Wolfe, Willam H., 9
Wolfe, William H., 9

Y

Yamada, Isao, 8
Yamamuro, T., 3

Z

Zardetto–Smith, Andrea M., 9
Zhang, Jianhai, 1
Zheltukhina, G. A., 1
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NORTH DAKOTA STATE UNIV. LIB.
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Fargo, ND 58105–5599
(701) 237–8886 Fax: (701) 237–7138

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Chester Fritz Library
University Station
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Grand Forks, ND 58202–9000
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Edmon Low Library
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Robert Muldrow Cooper Library
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Clemson, SC 29634–3001
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Merrill Library Documents Dept.
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Alderman Library
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