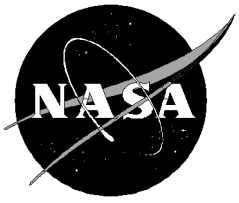
NASA/SP—2003-7039/SUPPL63
September 2003

NASA PATENT ABSTRACTS BIBLIOGRAPHY

A CONTINUING BIBLIOGRAPHY



National Aeronautics and
Space Administration
Langley Research Center
**Scientific and Technical
Information Program Office**

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Introduction

Several thousand inventions result each year from research supported by the National Aeronautics and Space Administration. NASA seeks patent protection on inventions to which it has title if the invention has important use in government programs or significant commercial potential. These inventions cover a broad range of technologies and include many that have useful and valuable commercial application.

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The *NASA Patent Abstracts Bibliography* is a semiannual NASA publication containing comprehensive abstracts of NASA-owned inventions covered by U.S. patents. The citations included were originally published in NASA's *Scientific and Technical Aerospace Reports (STAR)* and cover *STAR* announcements made since May 1969.

The citations published in this issue cover the period January 2003 through July 2003. The range of subjects covered includes the NASA Scope and Subject Category Guide's 10 broad subject divisions separated further into 76 specific categories. However, not all categories have citations during the dates covered for this issue, therefore the Table of Contents does not include all divisions and categories. This scheme was devised in 1975 and revised in 1987 and 2000 in lieu of the 34 category divisions which were utilized in supplements (01) through (06) covering *STAR* abstracts from May 1969 through January 1974. Each entry consists of a citation accompanied by an abstract and, when appropriate, a key illustration taken from the patent or application for patent. Entries are arranged by subject category in ascending order.

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Subject Term Index

Personal Author Index

NASA PATENT ABSTRACTS BIBLIOGRAPHY

A Continuing Bibliography (Suppl. 63)

SEPTEMBER 2003

02
AERODYNAMICS

Includes aerodynamics of flight vehicles, test bodies, airframe components and combinations, wings, and control surfaces. Also includes aerodynamics of rotors, stators, fans, and other elements of turbomachinery. For related information see also *34 Fluid Mechanics and Thermodynamics*.

20030053340 NASA Dryden Flight Research Center, Edwards, CA, USA

Airfoil Shaped Flow Angle Probe

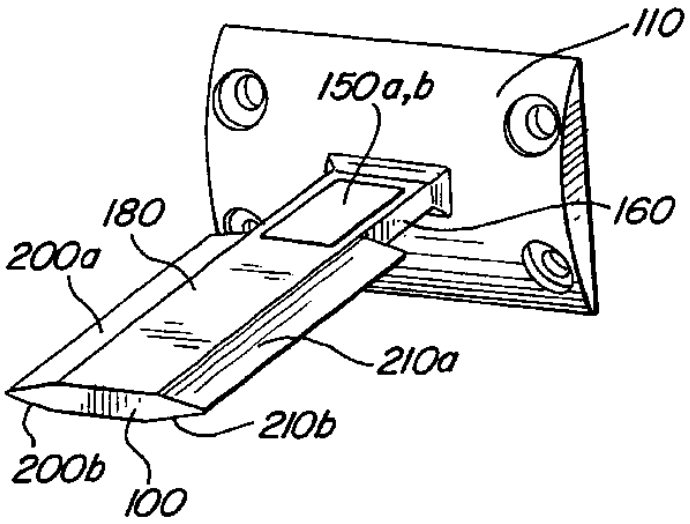
Corda, Stephen, Inventor; Vachon, Michael Jake, Inventor; March 04, 2003; 6 pp.; In English; Original contains black and white illustrations

Patent Info.: Filed 18 Jul. 2001; US-Patent-6,526,821; US-Patent-Appl-SN-909166; NASA-Case-DRC-00100-9; No Copyright; Avail: CASI; A02, Hardcopy

The present invention is a force-based instrument that measures local flow angle. The preferred embodiment of the invention has a low aspect ratio airfoil member connected to a mounting base. Using a series of strain gauges located at the connecting portion of the probe, aerodynamic forces on the airfoil member can be converted to strain, which in turn can be converted to local air flow measurements. The present invention has no moving parts and is well suited for measuring flow in a transonic and supersonic regime.

Author

Airfoils; Flow Measurement; Air Flow; Flow Direction Indicators



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SPACECRAFT PROPULSION AND POWER

Includes main propulsion systems and components, e.g., rocket engines; and spacecraft auxiliary power sources. For related information see also *07 Aircraft Propulsion and Power, 28 Propellants and Fuels, 15 Launch Vehicles and Launch Operations*, and *44 Energy Production and Conversion*.

20030053202 NASA Glenn Research Center, Cleveland, OH, USA

Reduced Toxicity Fuel Satellite Propulsion System Including Plasmatron

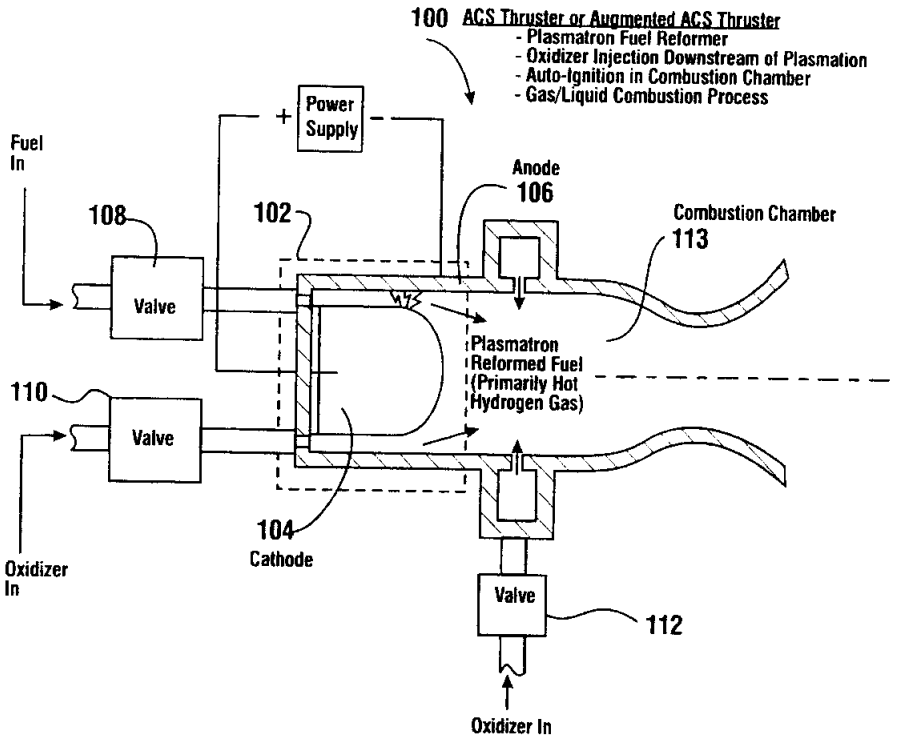
Schneider, Steven J., Inventor; April 15, 2003; 29 pp.; In English; Original contains black and white illustrations

Patent Info.: Filed 17 Apr. 2001; No Copyright; Avail: CASI; A03, Hardcopy

A reduced toxicity fuel satellite propulsion system including a reduced toxicity propellant supply for consumption in an axial class thruster and an ACS class thruster. The system includes suitable valves and conduits for supplying the reduced toxicity propellant to the ACS decomposing element of an ACS thruster. The ACS decomposing element is operative to decompose the reduced toxicity propellant into hot propulsive gases. In addition the system includes suitable valves and conduits for supplying the reduced toxicity propellant to an axial decomposing element of the axial thruster. The axial decomposing element is operative to decompose the reduced toxicity propellant into hot gases. The system further includes suitable valves and conduits for supplying a second propellant to a combustion chamber of the axial thruster. whereby the hot gases and the second propellant auto-ignite and begin the combustion process for producing thrust.

Author

Spacecraft Propulsion; Toxicity; Fuel Systems; Artificial Satellites; Plasmatrons



24
COMPOSITE MATERIALS

Includes physical, chemical, and mechanical properties of laminates and other composite materials.

20030015862 NASA Kennedy Space Center, Cocoa Beach, FL USA

Multipurpose Thermal Insulation Test Apparatus

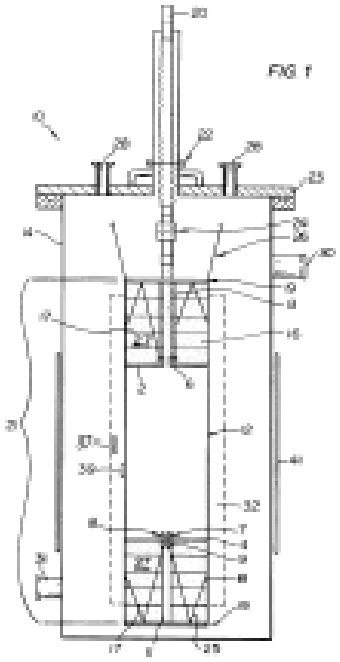
Fesmire, James E., Inventor; Augustynowicz, Stanislaw D., Inventor; Dec. 03, 2002; 13 pp.; In English

Patent Info.: Filed 9 Jul. 2001; US-Patent-6,487,866; US-Patent-Appl-SN-906011; US-Patent-Appl-SN-217317; NASA-Case-KSC-12108; No Copyright; Avail: CASI; A03, Hardcopy

A multi-purpose thermal insulation test apparatus is used for testing insulation materials, or other components. The test apparatus is a fluid boil-off calorimeter system for calibrated measurement of the apparent thermal conductivity (k-value) of a specimen material at a fixed vacuum level. The apparatus includes an inner vessel for receiving a fluid with a normal boiling point below ambient temperature, such as liquid nitrogen, enclosed within a vacuum chamber. A cold mass assembly, including the inner vessel and thermal guards, is suspended from the top of the vacuum chamber. Handling tools attach to the cold mass assembly for convenient manipulation of the assembly and for the installation or wrapping of insulation test materials. Liquid nitrogen is typically supplied to the inner vessel using a fill tube with funnel. A single port through the top of the vacuum chamber facilitates both filling and venting. Aerogel composite stacks with reflective films are fastened to the top and the bottom of the inner vessel as thermal guards. The comparative k-value of the insulation material is determined by measuring the boil-off flow rate of gas, the temperature differential across the insulation thickness, and the dimensions (length and diameters) of the test specimen.

Author

Thermal Insulation; Calorimeters; Thermal Conductivity; Vacuum Chambers



20030053353 NASA Langley Research Center, Hampton, VA, USA

Dry Process for Manufacturing Hybridized Boron Fiber/Carbon Fiber Thermoplastic Composite Materials from a Solution Coated Precursor

Belvin, Harry L., Inventor; Cano, Roberto J., Inventor; February 04, 2003; 13 pp.; In English

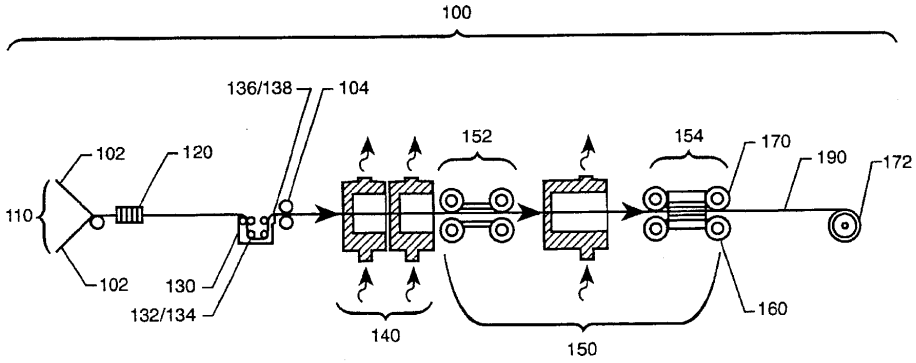
Patent Info.: Filed 8 Jun. 2000; US-Patent-6,514,370; US-Patent-Appl-SN-591384; NASA-Case-LAR-15852-1; No Copyright; Avail: CASI; A03, Hardcopy

An apparatus for producing a hybrid boron reinforced polymer matrix composite from precursor tape and a linear array of boron fibers. The boron fibers are applied onto the precursor tapes and the precursor tape processed within a processing

component having an impregnation bar assembly. After passing through variable-dimension forming nip-rollers, the precursor tape with the boron fibers becomes a hybrid boron reinforced polymer matrix composite. A driving mechanism is used to pulled the precursor tape through the method and a take-up spool is used to collect the formed hybrid boron reinforced polymer matrix composite.

Official Gazette of the U.S. Patent and Trademark Office

Boron Reinforced Materials; Boron Fibers; Fiber Composites; Polymer Matrix Composites; Fabrication



20030053357 NASA Langley Research Center, Hampton, VA, USA

Process of Making Boron-Fiber Reinforced Composite Tape

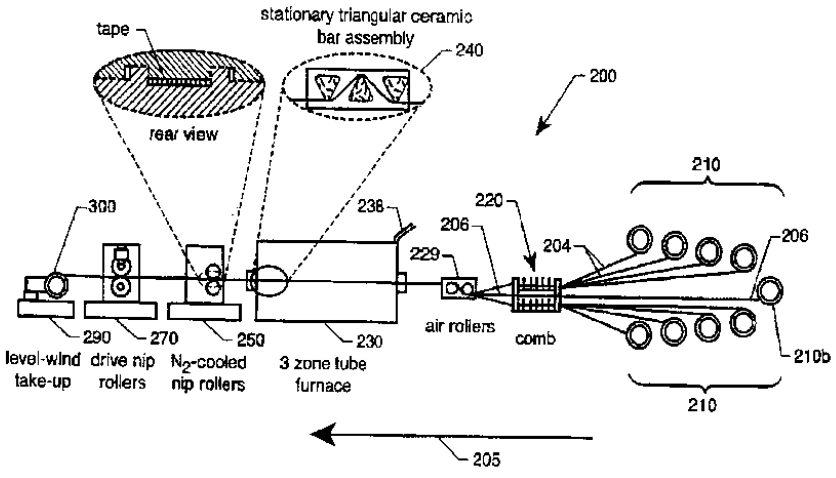
Belvin, Harry L., Inventor; Cano, Roberto J., Inventor; Johnston, Norman J., Inventor; Marchello, Joseph M., Inventor; December 31, 2002; 16 pp.; In English; Original contains black and white illustrations

Patent Info.: Filed 18 Jul. 2000; US-Patent-6,500,370; US-Patent-Appl-SN-620274; NASA-Case-LAR-15470-1-CU; No Copyright; Avail: CASI; A03, Hardcopy

The invention is an apparatus and method for producing a hybrid boron reinforced polymer matrix composition from powder pre-impregnated fiber tow bundles and a linear array of boron fibers. The boron fibers are applied onto the powder pre-impregnated fiber tow bundles and then are processed within a processing component having an impregnation bar assembly. After passing through variable-dimension forming nip-rollers, the powder pre-impregnated fiber tow bundles with the boron fibers become a hybrid boron reinforced polymer matrix composite tape. A driving mechanism pulls the powder pre-impregnated fiber tow bundles with boron fibers through the processing line of the apparatus and a take-up spool collects the formed hybrid boron-fiber reinforced polymer matrix composite tape.

Official Gazette of the U.S. Patent and Trademark Office

Boron Reinforced Materials; Boron Fibers; Ceramic Matrix Composites; Patents; Seals (Stoppers)



25
INORGANIC, ORGANIC AND PHYSICAL CHEMISTRY

Includes the analysis, synthesis, and use of inorganic and organic compounds; combustion theory; electrochemistry; and photochemistry. For related information see category *34 Fluid Dynamics and Thermodynamics*. For astrochemistry see category *90 Astrophysics*.

20030014486 NASA Langley Research Center, Hampton, VA USA
Phenylethynyl Containing Reactive Additives
Connell, John W., Inventor; Smith, Joseph G., Jr., Inventor; Hergenrother, Paul M., Inventor; Aug. 27, 2002; 16 pp.; In English
Patent Info.: Filed 28 Nov. 2000; US-Patent-6,441,099; US-Patent-Appl-SN-726297; US-Patent-Appl-SN-290295; NASA-Case-LAR-15543-2-1; No Copyright; Avail: CASI; A03, Hardcopy

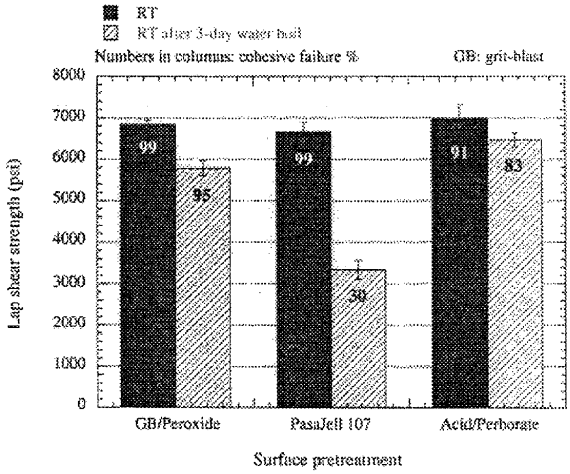
Phenylethynyl containing reactive additives were prepared from aromatic diamine, containing phenylethvnvl groups and various ratios of phthalic anhydride and 4-phenylethynviphthalic anhydride in glacial acetic acid to form the imide in one step or in N-methyl-2-pvrrolidinone to form the amide acid intermediate. The reactive additives were mixed in various amounts (10% to 90%) with oligomers containing either terminal or pendent phenylethynyl groups (or both) to reduce the melt viscosity and thereby enhance processability. Upon thermal cure, the additives react and become chemically incorporated into the matrix and effect an increase in crosslink density relative to that of the host resin. This resultant increase in crosslink density has advantageous consequences on the cured resin properties such as higher glass transition temperature and higher modulus as compared to that of the host resin.
Official Gazette of the U.S. Patent and Trademark Office
Acetic Acid; Additives; Glass Transition Temperature; Methyl Compounds

26
METALS AND METALLIC MATERIALS

Includes physical, chemical, and mechanical properties of metals and metallic materials; and metallurgy.

20030053363 NASA Langley Research Center, Hampton, VA, USA
Surface Treatment
Park, Cheol, Inventor; Lowther, Sharon E., Inventor; St.Clair, Terry L., Inventor; February 18, 2003; 22 pp.; In English
Patent Info.: Filed 9 Feb. 2001; No Copyright; Avail: CASI; A03, Hardcopy

A simple surface treatment process is provided which offers a high performance surface for a variety of applications at low cost. This novel surface treatment, which is particularly useful for Ti-6Al-4V alloys, is achieved by forming oxides on the surface with a two-step chemical process and without mechanical abrasion. First, after solvent degreasing, sulfuric acid is used to generate a fresh titanium surface. Next, an alkaline perborate solution is used to form an oxide on the surface. This acid-followed-by-base treatment is cost effective and relatively safe to use in commercial applications. In addition, it is chromium-free, and has been successfully used with a sol-gel coating to afford a strong adhesive bond that exhibits excellent durability after the bonded specimens have been subjected to a harsh 72 hour water boil immersion. Phenylethynyl containing adhesives were used to evaluate this surface treatment with a novel coupling agent containing both trialkoxysilane and phenylethynyl groups. 8 Claims, 16 Drawing Sheets
Official Gazette of the U.S. Patent and Trademark Office
Surface Treatment; Adhesives; Aluminum Alloys; Chemical Reactions; Chromium; Titanium Alloys; Vanadium Alloys



27
NONMETALLIC MATERIALS

Includes physical, chemical, and mechanical properties of plastics, elastomers, lubricants, polymers, textiles, adhesives, and ceramic materials. For composite materials see *24 Composite Materials*.

20030015761 NASA Glenn Research Center, Cleveland, OH USA

Polyesters by Photochemical Cyclopolymerization

Meador, Michael A., Inventor; Nov. 26, 2002; 9 pp.; In English

Patent Info.: Filed 5 Apr. 2001; US-Patent-6,486,230; US-Patent-Appl-SN-827089; NASA-Case-LEW-17133-2; No Copyright; Avail: CASI; A02, Hardcopy

The polyesters of this invention are derived from a Diels-Alder cyclopolymerization of a photochemically generated bisdiene with dienophiles, such as di(acrylates), tri (acrylates), di(methacrylates), tri(methacrylates) and mixtures thereof with mono(methacrylates) or mono(acrylate) end-caps. Irradiation of one or more diketones produces two distinct hydroxy o-quinodimethane (photoenol) intermediates. These intermediates are trapped via a Diels-Alder cycloaddition with appropriate dienophiles, e.g., di(acrylates) to give the corresponding in polyesters quantitative yields. When di(acrylates), tri(acrylates) and di and tri(methacrylates) or mixtures thereof with monoacrylate end-caps are used as the dienophile, the resulting polyesters have glass transition temperatures (Tg) as high as 200 C. Polyesters films can be prepared by ultraviolet irradiation of high solids content varnishes of the monomers in a small amount of solvent, e.g., cyclohexanone, dimethyl formamide, N-methylpyrollidone and the like. These polyesters, i.e. polyesters are characterized as having high glass transition temperatures, good mechanical properties and improved processing in the manufacture of composites, adhesives, electronic materials and films.

Official Gazette of the U.S. Patent and Trademark Office

Cyclic Compounds; Photochemical Reactions; Polyesters; Polymerization

32
COMMUNICATIONS AND RADAR

Includes radar; radio, wire, and optical communications; land and global communications; communications theory. For related information see also 04 Aircraft Communications and Navigation; and *17 Space Communications, Spacecraft Communications, Command and Tracking*; for search and rescue, see *03 Air Transportation and Safety*; and *16 Space Transportation and Safety*.

20030053342 NASA Marshall Space Flight Center, Huntsville, AL, USA

Method and Apparatus for Reading Two Dimensional Identification Symbols Using Radar Techniques

Schramm, Harry F., Jr., Inventor; Roxby, Donald L., Inventor; March 04, 2003; 6 pp.; In English

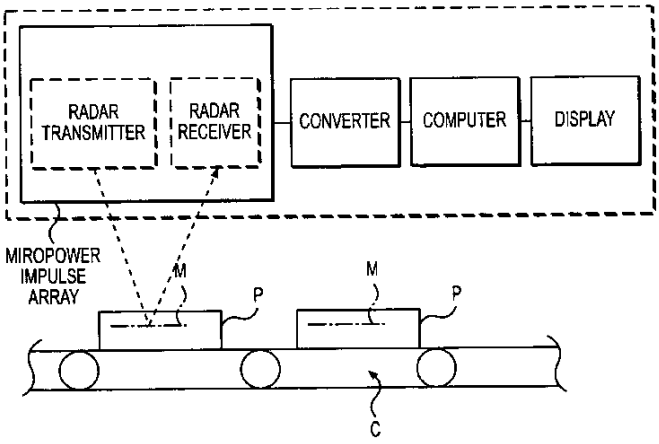
Patent Info.: Filed 16 Mar. 2000; US-Patent-6,529,154; US-Patent-Appl-SN-528795; NASA-Case-MFS-31230-1; No Copyright; Avail: CASI; A02, Hardcopy

A method and apparatus are provided for sensing two-dimensional identification marks provided on a substrate or embedded within a substrate below a surface of the substrate. Micropower impulse radar is used to transmit a high risetime,

short duration pulse to a focussed radar target area of the substrate having the two dimensional identification marks. The method further includes the steps of listening for radar echoes returned from the identification marks during a short listening period window occurring a predetermined time after transmission of the radar pulse. If radar echoes are detected, an image processing step is carried out. If no radar echoes are detected, the method further includes sequentially transmitting further high risetime, short duration pulses, and listening for radar echoes from each of said further pulses after different elapsed times for each of the further pulses until radar echoes are detected. When radar echoes are detected, data based on the detected echoes is processed to produce an image of the identification marks.

Author

Patents; Radar Echoes; Pulse Radar; Image Processing; Substrates



20030053377 NASA Marshall Space Flight Center, Huntsville, AL, USA

Infrared Communication System

Dewberry, Brandon Scott, Inventor; Varnavas, Kosta A., Inventor; January 14, 2003; 7 pp.; In English

Patent Info.: Filed 16 Jun. 1999; US-Patent-6,507,425; US-Patent-Appl-SN-334412; NASA-Case-MFS-31331-1; No Copyright; Avail: CASI; A02, Hardcopy

An infrared communication system includes a reconfigurable RAM-based programmable logic device (PLD), an EPROM to provide configuration instructions to the PLD, and a clock supplying a clock signal to the PLD. A data input device and infrared transceiver are coupled to the PLD. The configured PLD uses the clock signal to synchronize data transfer between the data input device and the infrared transceiver.

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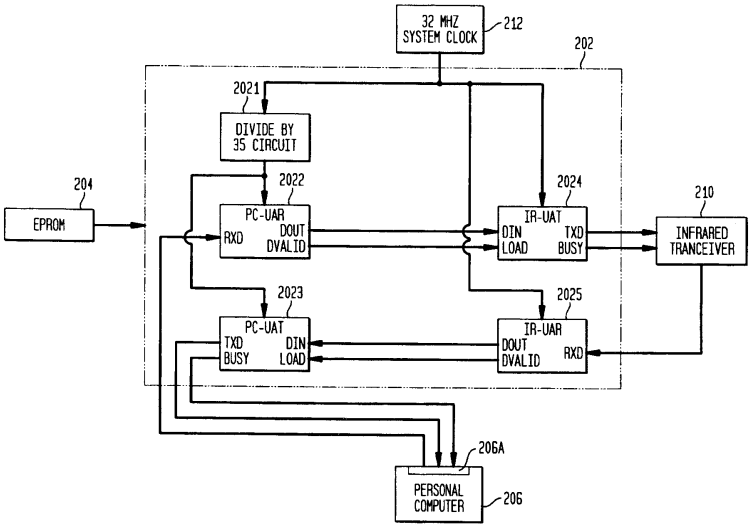
Infrared Instruments; Communication



33
ELECTRONICS AND ELECTRICAL ENGINEERING

Includes development, performance, and maintainability of electrical/electronic devices and components; related test equipment; and microelectronics and integrated circuitry. for related information see also *60 Computer Operations and Hardware*; and *76 Solid-State Physics*. For communications equipment and devices see *32 Communications and Radar*.

20030014582 NASA Ames Research Center, Moffett Field, CA USA

Method and Apparatus for Evaluating the Visual Quality of Processed Digital Video Sequences

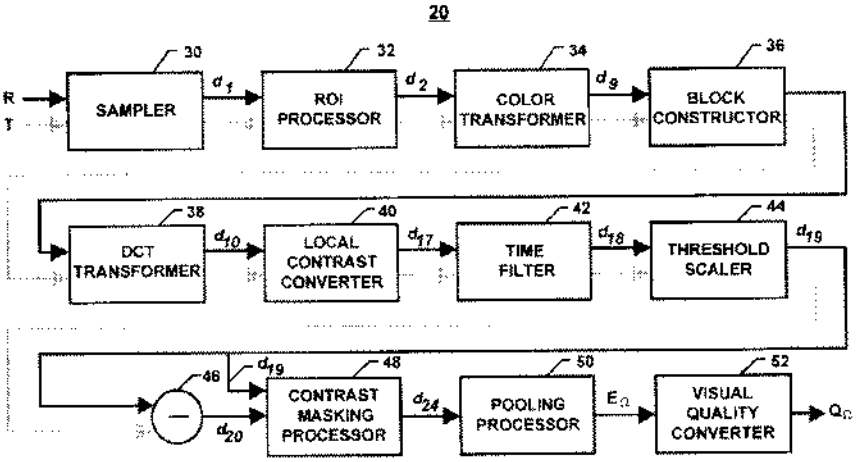
Watson, Andrew B., Inventor; Dec. 10, 2002; 18 pp.; In English

Patent Info.: Filed 12 Mar. 1999; US-Patent-6,493,023; US-Patent-Appl-SN-266962; NASA-Case-ARC-14236-1; No Copyright; Avail: CASI; A03, Hardcopy

A Digital Video Quality (DVQ) apparatus and method that incorporate a model of human visual sensitivity to predict the visibility of artifacts. The DVQ method and apparatus are used for the evaluation of the visual quality of processed digital video sequences and for adaptively controlling the bit rate of the processed digital video sequences without compromising the visual quality. The DVQ apparatus minimizes the required amount of memory and computation. The input to the DVQ apparatus is a pair of color image sequences: an original (R) non-compressed sequence, and a processed (T) sequence. Both sequences (R) and (T) are sampled, cropped, and subjected to color transformations. The sequences are then subjected to blocking and discrete cosine transformation, and the results are transformed to local contrast. The next step is a time filtering operation which implements the human sensitivity to different time frequencies. The results are converted to threshold units by dividing each discrete cosine transform coefficient by its respective visual threshold. At the next stage the two sequences are subtracted to produce an error sequence. The error sequence is subjected to a contrast masking operation, which also depends upon the reference sequence (R). The masked errors can be pooled in various ways to illustrate the perceptual error over various dimensions, and the pooled error can be converted to a visual quality measure.

Official Gazette of the U.S. Patent and Trademark Office

Digital Television; Discrete Cosine Transform; Video Compression; Imaging Techniques; Visual Discrimination; Sequencing



20030053337 NASA Langley Research Center, Hampton, VA, USA

Polymer-Polymer Bilayer Actuator

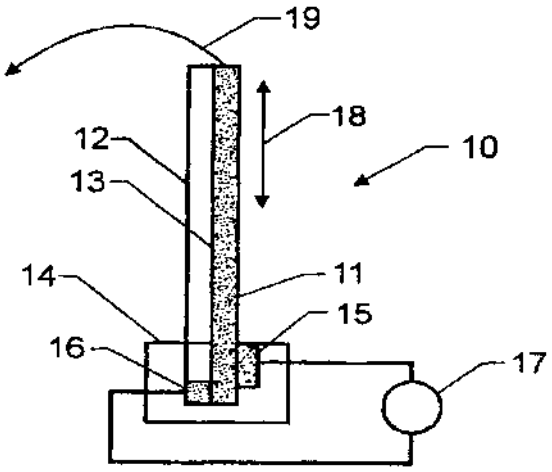
Su, Ji, Inventor; Harrison, Joycelyn S., Inventor; St.Clair, Terry L., Inventor; April 08, 2003; 7 pp.; In English

Patent Info.: Filed 23 Oct. 2000; No Copyright; Avail: CASI; A02, Hardcopy

A device for providing an electromechanical response includes two polymeric webs bonded to each other along their lengths. At least one polymeric web is activated upon application thereto of an electric field and exhibits electrostriction by rotation of polar graft moieties within the polymeric web. In one embodiment, one of the two polymeric webs in an active web upon application thereto of the electric field, and the other polymeric web is a non-active web upon application thereto of the electric field. In another embodiment, both of the two polymeric webs are capable of being active webs upon application thereto of the electric field. However, these two polymeric webs are alternately activated and non-activated by the electric field.

Author

Polymers; Actuators; Electromechanical Devices



20030053364 NASA Pasadena Office, CA, USA

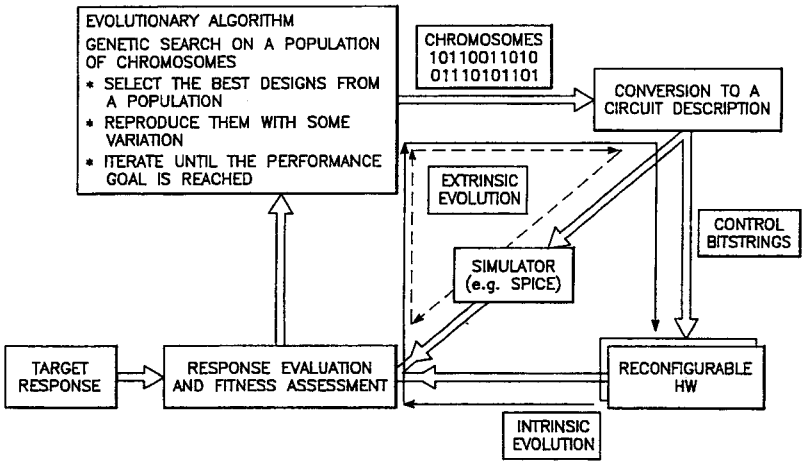
Evolutionary Technique for Automated Synthesis of Electronic Circuits

Stoica, Adrian, Inventor; Salazar-Lazaro, Carlos Harold, Inventor; February 25, 2003; 12 pp.; In English

Patent Info.: Filed 7 Jun. 2000; No Copyright; Avail: CASI; A03, Hardcopy

A method for evolving a circuit comprising configuring a plurality of transistors using a plurality of reconfigurable switches so that each of the plurality of transistors has a terminal coupled to a terminal of another of the plurality of transistors that is controllable by a single reconfigurable switch. The plurality of reconfigurable switches being controlled in response to a chromosome pattern. The plurality of reconfigurable switches may be controlled using an annealing function. As such, the plurality of reconfigurable switches may be controlled by selecting qualitative values for the plurality of reconfigurable switches in response to the chromosomal pattern, selecting initial quantitative values for the selected qualitative values, and morphing the initial quantitative values. Typically, subsequent quantitative values will be selected more divergent than the initial quantitative values. The morphing process may continue to partially or to completely polarize the quantitative values. Author

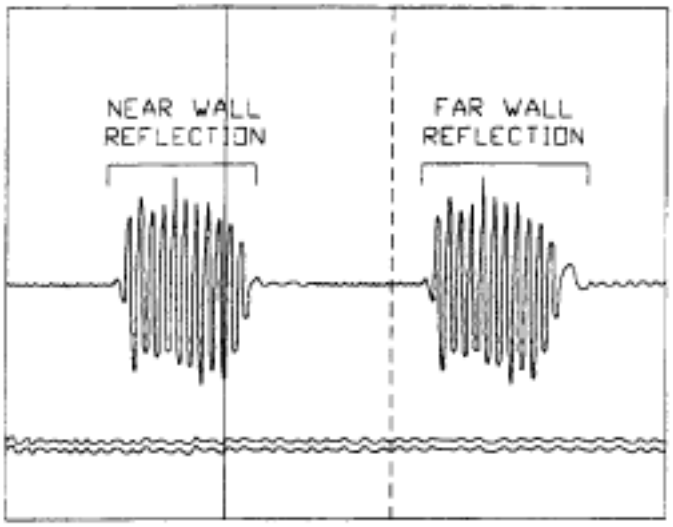
Evolvable Hardware; Synthesis; Circuits



Includes fluid dynamics and kinematics and all forms of heat transfer; boundary layer flow; hydrodynamics; hydraulics; fluidics; mass transfer and ablation cooling. For related information see also *02 Aerodynamics*.

20030015760 NASA Johnson Space Center, Houston, TX USA
Bubble Measuring Instrument and Method
Kline-Schoder, Robert, Inventor; Magari, Patrick J., Inventor; Oct. 01, 2002; 18 pp.; In English
Patent Info.: Filed 26 Mar. 2002; US-Patent-6,457,346; US-Patent-Appl-SN-113642; US-Patent-Appl-SN-498440; NASA-Case-MSC-22980-4; No Copyright; Avail: CASI; A03, Hardcopy

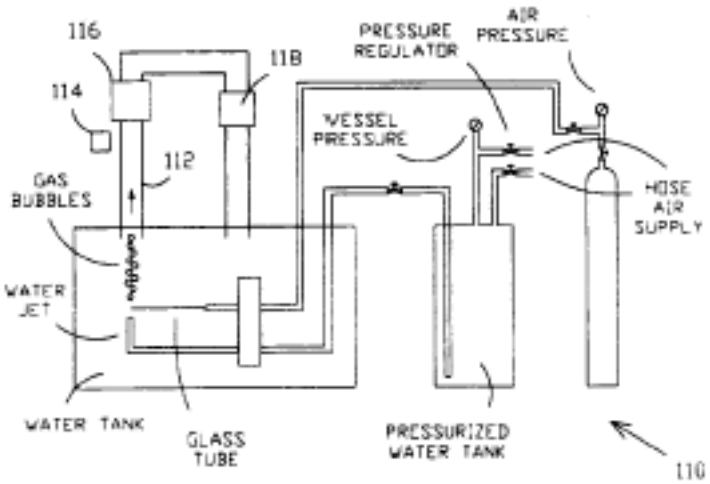
Method and apparatus are provided for a non-invasive bubble measuring instrument operable for detecting, distinguishing, and counting gaseous embolisms such as bubbles over a selectable range of bubble sizes of interest. A selected measurement volume in which bubbles may be detected is insonified by two distinct frequencies from a pump transducer and an image transducer, respectively. The image transducer frequency is much higher than the pump transducer frequency. The relatively low-frequency pump signal is used to excite bubbles to resonate at a frequency related to their diameter. The image transducer is operated in a pulse-echo mode at a controllable repetition rate that transmits bursts of high-frequency ultrasonic signal to the measurement volume in which bubbles may be detected and then receives the echo. From the echo or received signal, a beat signal related to the repetition rate may be extracted and used to indicate the presence or absence of a resonant bubble. In a preferred embodiment, software control maintains the beat signal at a preselected frequency while varying the pump transducer frequency to excite bubbles of different diameters to resonate depending on the range of bubble diameters selected for investigation.
Official Gazette of the U.S. Patent and Trademark Office
Bubbles; Embolisms; Measuring Instruments; Image Transducers



20030015803 NASA Johnson Space Center, Houston, TX USA
Bubble Measuring Instrument and Method
Kline-Schoder, Robert, Inventor; Magari, Patrick J., Inventor; Oct. 22, 2002; 19 pp.; In English
Patent Info.: Filed 26 Mar. 2002; US-Patent-6,467,331; US-Patent-Appl-SN-113646; US-Patent-Appl-SN-498440; NASA-Case-MSC-22980-5; No Copyright; Avail: CASI; A03, Hardcopy

Method and apparatus are provided for a non-invasive bubble measuring instrument operable for detecting, distinguishing, and counting gaseous embolisms such as bubbles over a selectable range of bubble sizes of interest. A selected measurement volume in which bubbles may be detected is insonified by two distinct frequencies from a pump transducer and an image transducer, respectively. The image transducer frequency is much higher than the pump transducer frequency. The relatively low-frequency pump signal is used to excite bubbles to resonate at a frequency related to their diameter. The image transducer is operated in a pulse-echo mode at a controllable repetition rate that transmits bursts of high-frequency ultrasonic signal to the measurement volume in which bubbles may be detected and then receives the echo. From the echo or received

signal, a beat signal related to the repetition rate may be extracted and used to indicate the presence or absence of a resonant bubble. In a preferred embodiment, software control maintains the beat signal at a preselected frequency while varying the pump transducer frequency to excite bubbles of different diameters to resonate depending on the range of bubble diameters selected for investigation.
Author
Bubbles; Measuring Instruments; Detection; Counting; Size Determination

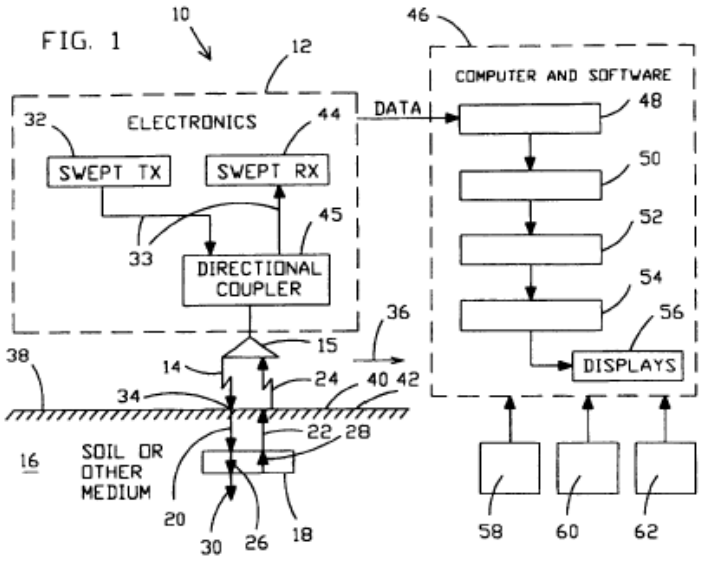


35
INSTRUMENTATION AND PHOTOGRAPHY

Includes remote sensors; measuring instruments and gages; detectors; cameras and photographic supplies; and holography. For aerial photography see *43 Earth Resources and Remote Sensing*. For related information see also *06 Avionics and Aircraft Instrumentation*; and *19 Spacecraft Instrumentation and Astrionics*.

20030015762 NASA Johnson Space Center, Houston, TX USA
Method for Locating a Concealed Object
Arndt, G. Dickey, Inventor; Carl, James R., Inventor; Byerly, Kent A., Inventor; Ngo, Phong H., Inventor; Stolarczyk, Larry G., Inventor; Dec. 31, 2002; 18 pp.; In English
Patent Info.: Filed 2 Apr. 2001; US-Patent-6,501,414; US-Patent-Appl-SN-826402; NASA-Case-MSC-22839-1; No Copyright; Avail: CASI; A03, Hardcopy

Apparatus and methods are disclosed for detecting anomalies in microwave penetrable material that may be used for locating plastic mines or pipes underneath the ground. A transmitter is positioned at a plurality of different positions above the ground. A microwave signal is transmitted that is stepped over a plurality of frequencies. At each position, a plurality of reflections are received corresponding to each of the plurality of frequencies that were transmitted. A complex target vector may be produced at each position that contains complex values corresponding to magnitude, phase, and time delay for each of the plurality of reflections received at that location. A complex reference data vector may be produced, either based on predetermined values or based on data from the received plurality of reflections. A comparison is made between the complex target vector and the complex reference data vector to produce a channel vector. In one embodiment, an operator may be applied to the channel vector such as a complex filter matrix or to add a complex conjugate. A response signal is produced and anomalies are detected by variations in the response signal with respect to the plurality of positions.
Official Gazette of the U.S. Patent and Trademark Office
Microwaves; Position (Location); Equipment; Anomalies



20030053366 NASA, Washington, DC, USA

Cable and Line Inspection Mechanism

Ross, Terence J., Inventor; January 28, 2003; 11 pp.; In English

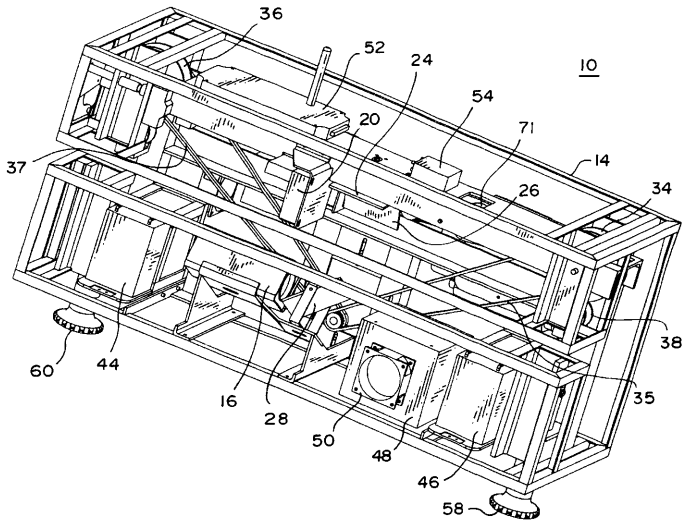
Patent Info.: Filed 9 Feb. 1999; US-Patent-6,512,536 B1

Report No.(s): US-Patent-6,512,536; US-Patent-Appl-SN-09-257-135; No Copyright; Avail: CASI; A03, Hardcopy

An automated cable and line inspection mechanism visually scans the entire surface of a cable as the mechanism travels along the cable=s length. The mechanism includes a drive system, a video camera, a mirror assembly for providing the camera with a 360 degree view of the cable, and a laser micrometer for measuring the cable=s diameter. The drive system includes an electric motor and a plurality of drive wheels and tension wheels for engaging the cable or line to be inspected, and driving the mechanism along the cable. The mirror assembly includes mirrors that are positioned to project multiple images of the cable on the camera lens, each of which is of a different portion of the cable. A data transceiver and a video transmitter are preferably employed for transmission of video images, data and commands between the mechanism and a remote control station.

Author

Inspection; Lasers; Remote Control; Scanners; Video Data; Cables (Ropes)



37
MECHANICAL ENGINEERING

Includes mechanical devices and equipment; machine elements and processes. For cases where the application of a device or the host vehicle is emphasized see also the specific category where the application or vehicle is treated. For robotics see *63 Cybernetics, Artificial Intelligence, and Robotics*; and *54 Man/System Technology and Life Support*.

20030053349 NASA Marshall Space Flight Center, Huntsville, AL, USA

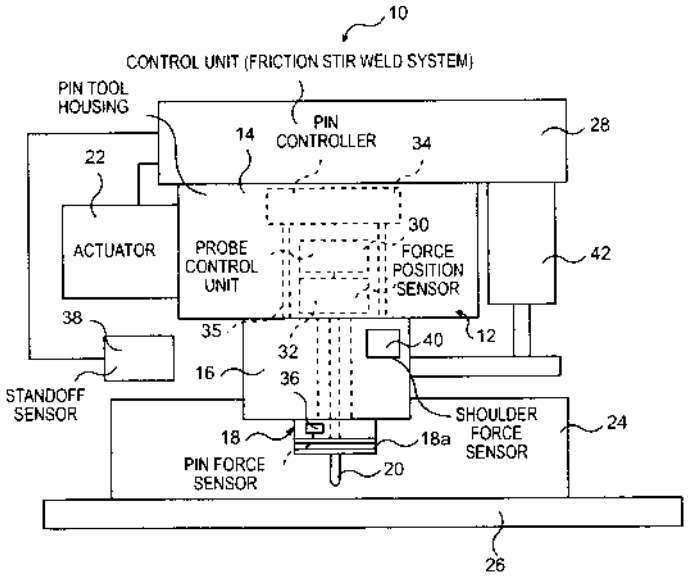
System for Controlling the Stirring Pin of a Friction Stir Welding Apparatus

Ding, R. Jeffrey, Inventor; Romine, Peter L., Inventor; Oelgoetz, Peter A., Inventor; December 24, 2002; 9 pp.; In English Patent Info.: Filed 13 Oct. 2000; No Copyright; Avail: CASI; A02, Hardcopy

A control is provided for a friction stir welding apparatus comprising a pin tool which includes a shoulder and a rotating pin extending outwardly from the shoulder of the pin tool and which, in use, is plunged into a workpiece formed contacting workpiece members to stir weld the members together. The control system controls the penetration of the pin tool into the workpiece members which are mounted on a support anvil. The control system includes a pin length controller for controlling pin length relative to the shoulder and for producing a corresponding pin length signal. A pin force sensor senses the force being exerted on the pin during welding and produces a corresponding actual pin force signal. A probe controller controls a probe extending outwardly from the pin, senses a parameter related to the distance between the probe and the supporting anvil and produces a corresponding probe signal. A workpiece standoff sensor senses the standoff distance between the workpiece and the standoff sensor and produces a corresponding standoff signal. A control unit receives the various signals, together with a weld schedule, and, based on these signals and the weld schedule, controls the pin length controller so as to control pin penetration into the workpiece.

Author

Controllers; Friction Stir Welding; Pins; Rotation



39
STRUCTURAL MECHANICS

Includes structural element design, analysis and testing; dynamic responses of structures; weight analysis; fatigue and other structural properties; and mechanical and thermal stresses in structures. For applications see *05 Aircraft Design, Testing and Performance*; and *18 Spacecraft Design, Testing and Performance*.

20030053338 NASA Marshall Space Flight Center, Huntsville, AL, USA

Passive Ball Capture Joint

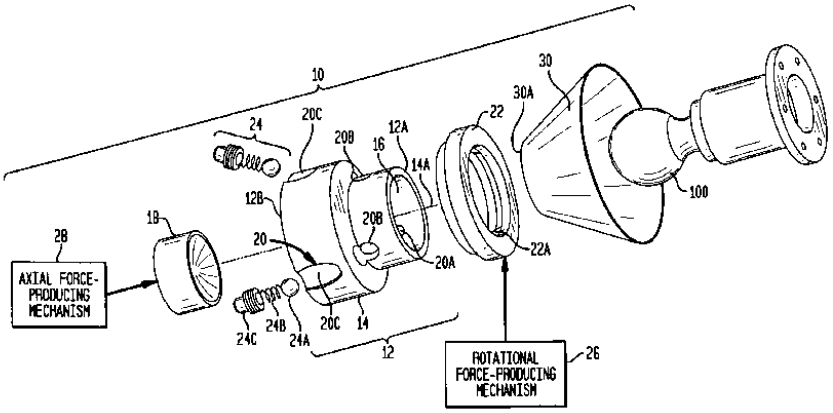
Cloyd, Richard A., Inventor; Bryan, Thomas C., Inventor; April 1, 2003; 8 pp.; In English; Original contains black and white illustrations

Patent Info.: Filed 4 Sep. 2001; US-Patent-6,540,426; US-Patent-Appl-SN-949408; NASA-Case-MFS-31616-1; No Copyright; Avail: CASI; A02, Hardcopy

A passive ball capture joint has a sleeve with a plurality of bores distributed about a circumference thereof and formed therethrough at an acute angle relative to the sleeve's longitudinal axis. A spring-loaded retainer is slidingly fitted in each bore and is biased such that, if allowed, will extend at least partially into the sleeve to retain a ball therein. A ring, rotatably mounted about the bores, has an interior wall defining a plurality of shaped races that bear against the spring-loaded retainers. A mechanized rotational force producer is coupled to the ring. The ring can be rotated from a first position (that presses the retainers into the sleeve to lock the ball in place) to a second position (that allows the retainers to springback out of the sleeve to release the ball).

Official Gazette of the U.S. Patent and Trademark Office

Balls; Joints (Junctions); Mechanical Engineering; Couplings



51
LIFE SCIENCES (GENERAL)

Includes general research topics related to plant and animal biology (non-human); ecology; microbiology; and also the origin, development, structure, and maintenance of animals and plants in space and related environmental conditions. For specific topics in life sciences see *categories 52 through 55*.

20030014583 NASA Johnson Space Center, Houston, TX USA

Evaluation of Biofilms and the Effects of Biocides Thereon

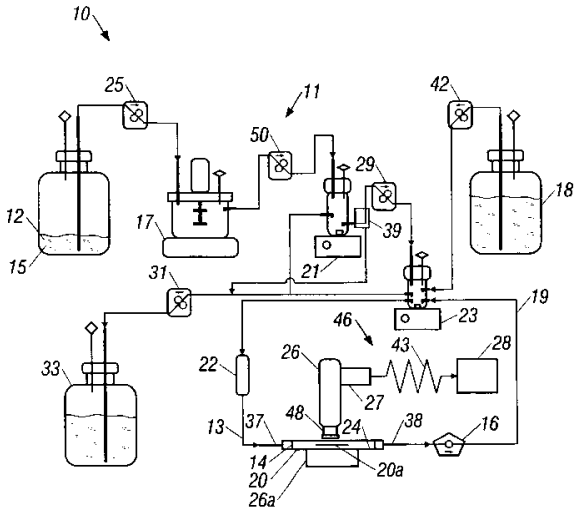
Pierson, Duane L., Inventor; Koenig, David W., Inventor; Mishra, Saroj K., Inventor; Dec. 24, 2002; 26 pp.; In English

Patent Info.: Filed 18 May 1999; US-Patent-6,498,862; US-Patent-Appl-SN-316913; NASA-Case-MSC-22679-1; No Copyright; Avail: CASI; A03, Hardcopy

Biofilm formation is monitored by real-time continuous measurement. Images are formed of sessile cells on a surface and planktonic cells adjacent the surface. The attachment of cells to the surface is measured and quantitated, and sessile and planktonic cells are distinguished using image processing techniques. Single cells as well as colonies are monitored on or adjacent a variety of substrates. Flowing streams may be monitored. The effects of biocides on biofilms commonly isolated from recyclable water systems are measured.

Official Gazette of the U.S. Patent and Trademark Office

Biofilms; Poisons; Cells (Biology); Plankton



20030015804 NASA Johnson Space Center, Houston, TX USA

Endothelium Preserving Microwave Treatment for Atherosclerosis

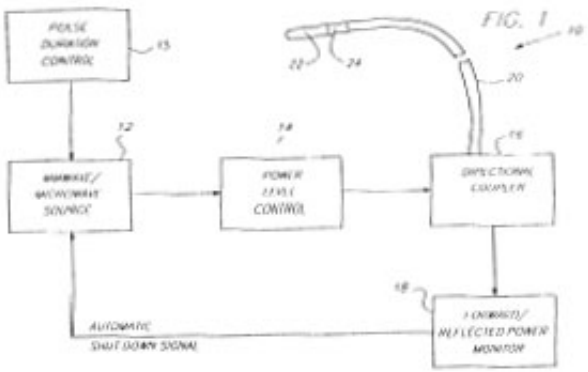
Carl, James R., Inventor; Arndt, Dickey, Inventor; Fink, Patrick W., Inventor; Beer, Reginald, Inventor; Henry, Phillip D., Inventor; Pacifico, Antonio, Inventor; Raffoul, George W., Inventor; Dec. 17, 2002; 23 pp.; In English

Patent Info.: Filed 9 Feb. 2000; US-Patent-6,496,736; US-Patent-Appl-SN-500538; US-Patent-Appl-SN-129832; US-Patent-Appl-SN-641045; NASA-Case-MSC-22724-5; No Copyright; Avail: CASI; A03, Hardcopy

Method and apparatus are provided to treat atherosclerosis wherein the artery is partially closed by dilating the artery while preserving the vital and sensitive endothelial layer thereof. Microwave energy having a frequency from 3 GHz to 300 GHz is propagated into the arterial wall to produce a desired temperature profile therein at tissue depths sufficient for thermally necrosing connective tissue and softening fatty and waxy plaque while limiting heating of surrounding tissues including the endothelial layer and/or other healthy tissue, organs, and blood. The heating period for raising the temperature a potentially desired amount, about 20 C. within the atherosclerotic lesion may be less than about one second. In one embodiment of the invention, a radically beveled waveguide antenna is used to deliver microwave energy at frequencies from 25 GHz or 30 GHz to about 300 GHz and is focused towards a particular radial sector of the artery. Because the atherosclerotic lesions are often asymmetrically disposed, directable or focussed heating preserves healthy sectors or the artery and applies energy to the asymmetrically positioned lesion faster than a non-directed bean. A computer simulation predicts isothermic temperature profiles for the given conditions and may be used in selecting power, pulse duration, beam width, and frequency of operation to maximize energy deposition and control heat rise within the atherosclerotic lesion without harming healthy tissues or the sensitive endothelium cells.

Official Gazette of the U.S. Patent and Trademark Office

Arteries; Arteriosclerosis; Endothelium; Microwaves; Cells (Biology)



20030015861 NASA Johnson Space Center, Houston, TX USA

Growth Stimulation of Biological Cells and Tissue by Electromagnetic Fields and Uses Thereof

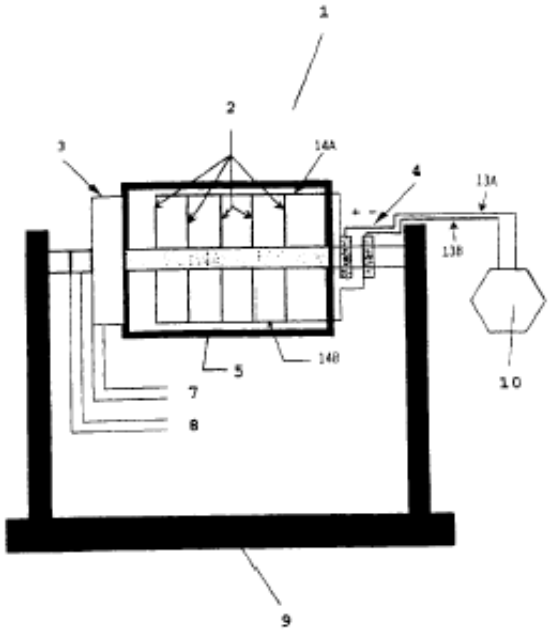
Wolf, David A., Inventor; Goodwin, Thomas J., Inventor; Nov. 26, 2002; 23 pp.; In English

Patent Info.: Filed 2 Jun. 2000; US-Patent-6,485,963; US-Patent-Appl-SN-587028; NASA-Case-MSC-22633-1; No Copyright; Avail: CASI; A03, Hardcopy

The present invention provides systems for growing two or three dimensional mammalian cells within a culture medium facilitated by an electromagnetic field, and preferably, a time varying electromagnetic field. The cells, and culture medium are contained within a fixed or rotating culture vessel, and the electromagnetic field is emitted from at least one electrode. In one embodiment, the electrode is spaced from the vessel. The invention further provides methods to promote neural tissue regeneration by means of culturing the neural cells in the claimed system. In one embodiment, neuronal cells are grown within longitudinally extending tissue strands extending axially along and within electrodes comprising electrically conductive channels or guides through which a time varying electrical current is conducted, the conductive channels being positioned within a culture medium.

Official Gazette of the U.S. Patent and Trademark Office

Cells (Biology); Culture Techniques; Electromagnetic Fields; Stimulation; Tissues (Biology)



76
SOLID-STATE PHYSICS

Includes condensed matter physics, crystallography, and superconductivity. For related information see also *33 Electronics and Electrical Engineering*; and *36 Lasers and Masers*.

20030014584 NASA Glenn Research Center, Cleveland, OH USA

Method for Growing Low-Defect Single Crystal Heteroepitaxial Films

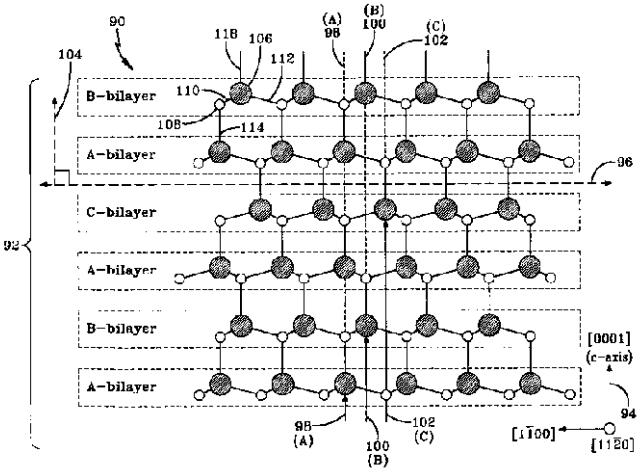
Powell, J. Anthony, Inventor; Neudeck, Philip G., Inventor; Dec. 03, 2002; 56 pp.; In English

Patent Info.: Filed 25 Sep. 2001; US-Patent-6,488,771; US-Patent-Appl-SN-965250; NASA-Case-LEW-17186-1; No Copyright; Avail: CASI; A04, Hardcopy

A method is disclosed for growing high-quality low-defect crystal films heteroepitaxially on substrates that are different than the crystal films. The growth of the first two heteroepitaxial bilayers is performed on a first two-dimensional nucleate island before a second growth of two-dimensional nucleation is allowed to start. The method is particularly suited for the growth of 3C-SiC, 2H-AlN, or 2H-GaN on 6H-SiC, 4H-SiC, or silicon substrates.

Official Gazette of the U.S. Patent and Trademark Office

Crystal Growth; Thin Films; Silicon Carbides; Aluminum Nitrides; Gallium Nitrides



20030015863 NASA Johnson Space Center, Houston, TX USA

Method and Apparatus for Reducing the Vulnerability of Latches to Single Event Upsets

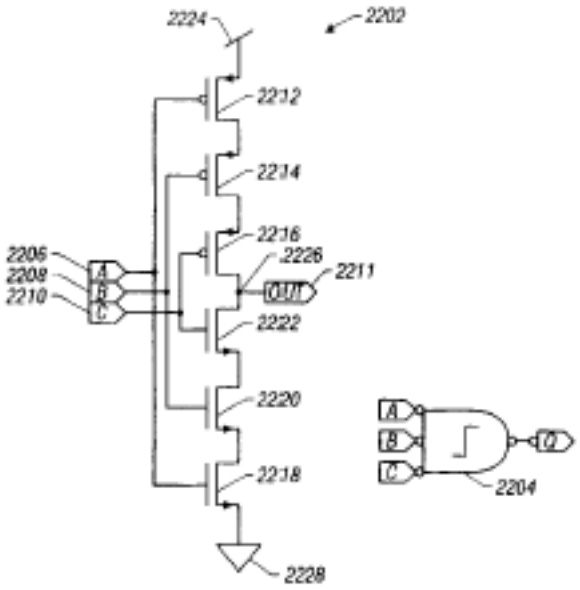
Shuler, Robert L., Jr., Inventor; Dec. 10, 2002; 29 pp.; In English

Patent Info.: Filed 20 Apr. 2001; US-Patent-6,492,857; US-Patent-Appl-SN-840684; US-Patent-Appl-SN-525371; NASA-Case-MSC-22953-2; No Copyright; Avail: CASI; A03, Hardcopy

A delay circuit includes a first network having an input and an output node, a second network having an input and an output, the input of the second network being coupled to the output node of the first network. The first network and the second network are configured such that: a glitch at the input to the first network having a length of approximately one-half of a standard glitch time or less does not cause tile voltage at the output of the second network to cross a threshold, a glitch at the input to the first network having a length of between approximately one-half and two standard glitch times causes the voltage at the output of the second network to cross the threshold for less than the length of the glitch, and a glitch at the input to the first network having a length of greater than approximately two standard glitch times causes the voltage at the output of the second network to cross the threshold for approximately the time of the glitch. A method reduces the vulnerability of a latch to single event upsets. The latch includes a gate having an input and an output and a feedback path from the output to the input of the gate. The method includes inserting a delay into the feedback path and providing a delay in the gate.

Author

Delay Circuits; Latches; Single Event Upsets; Vulnerability



Includes aviation law; space law and policy; international law; international cooperation; and patent policy.

20030053346 NASA Marshall Space Flight Center, Huntsville, AL, USA

Hypergolic Ignitor Assembly

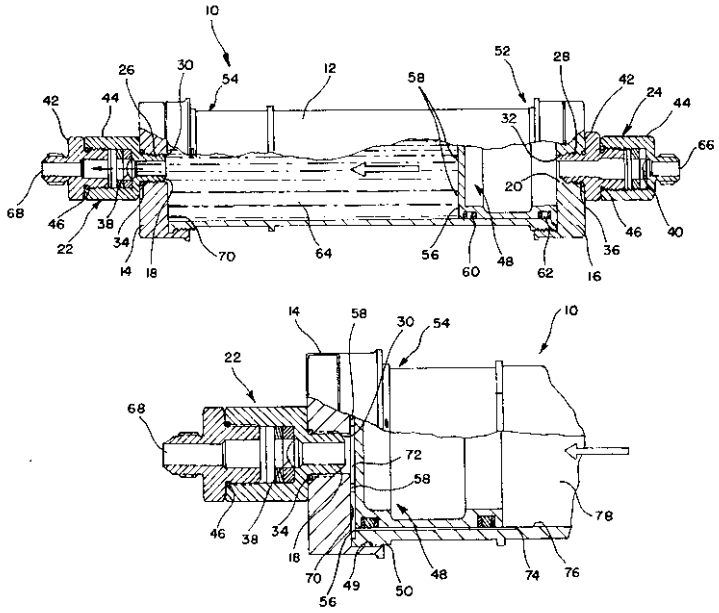
Taylor, Eric S., Inventor; Myers, W. Neill, Inventor; Martin, Michael A., Inventor; December 24, 2002; 6 pp.; In English; Original contains black and white illustrations

Patent Info.: Filed 6 Jun. 2001; US-Patent-6,497,091; US-Patent-Appl-SN-877800; NASA-Case-MFS-31584-1; No Copyright; Avail: CASI; A02, Hardcopy

An ignitor for use with the MC-I rocket engine has a cartridge bounded by two end caps with rupture disc assemblies connected thereto. A piston assembly within the cartridge moves from one end of the cartridge during the ignition process. The inlet of the ignitor communicates with a supply taken from the discharge of the fuel pump. When the pump is initially started, the pressure differential bursts the first rupture disc to begin the movement of the piston assembly toward the discharge end. The pressurization of the cartridge causes the second rupture to rupture and hypergolic fluid contained within the cartridge is discharged out the outlet. Once the piston assembly reaches the discharge end of the cartridge, purge grooves allow for fuel and remaining hypergolic fluid, to be discharged out the ignitor outlet into the combustion chamber to purge the ignitor of any remaining hypergolic fluid.

Official Gazette of the U.S. Patent and Trademark Office

Ignition; Rocket Engines; Assembling; Hypergolic Rocket Propellants



20030053347 NASA Glenn Research Center, Cleveland, OH, USA

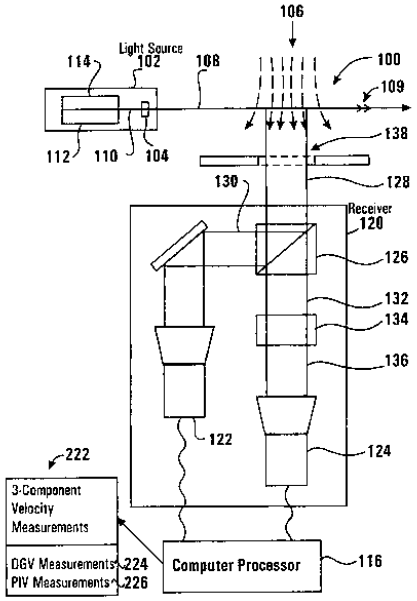
Planar Particle Imaging and Doppler Velocimetry System and Method

Wernet, Mark P., Inventor; April 1, 2003; 13 pp.; In English; Original contains black and white illustrations

Patent Info.: Filed 4 Jun. 2001; US-Patent-6,542,226; US-Patent-Appl-SN-874956; NASA-Case-LEW-17111-1; No Copyright; Avail: CASI; A03, Hardcopy

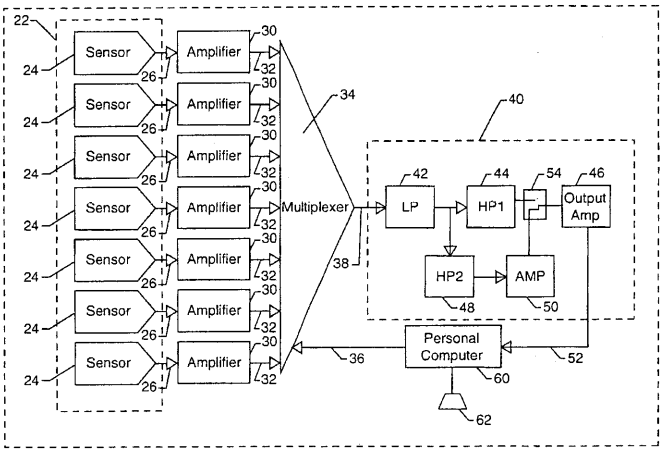
A planar velocity measurement system (100) is operative to measure all three velocity components of a flowing fluid (106) across an illuminated plane (108) using only a single line of sight. The fluid flow is seeded with small particles which accurately follow the flow field fluctuations. The seeded flow field is illuminated with pulsed laser light source (102) and the positions of the particles in the flow are recorded on CCD cameras (122,124). The in-plane velocities are measured by determining the in-plane particle displacements. The out-of-plane velocity component is determined by measuring the Doppler

shift of the light scattered by the particles. Both gas and liquid velocities can be measured, as well as two-phase flows.
Official Gazette of the U.S. Patent and Trademark Office
Fluid Flow; Velocity Measurement; Planar Structures; Illuminating; Methodology



20030053360 NASA Langley Research Center, Hampton, VA, USA
Passive Fetal Heart Monitoring System
Zuckerwar, Allan J., Inventor; Mowrey, Dennis L., Inventor; April 22, 2003; 13 pp.; In English
Patent Info.: Filed 13 Feb. 2001; No Copyright; Avail: CASI; A03, Hardcopy

A fetal heart monitoring system and method for detecting and processing acoustic fetal heart signals transmitted by different signal transmission modes. One signal transmission mode, the direct contact mode, occurs in a first frequency band when the fetus is in direct contact with the maternal abdominal wall. Another signal transmission mode, the fluid propagation mode, occurs in a second frequency band when the fetus is in a recessed position with no direct contact with the maternal abdominal wall. The second frequency band is relatively higher than the first frequency band. The fetal heart monitoring system and method detect and process acoustic fetal heart signals that are in the first frequency band and in the second frequency band.
Official Gazette of the U.S. Patent and Trademark Office
Detection; Heart; Signal Transmission; Fetuses



20030053367 NASA Pasadena Office, CA, USA

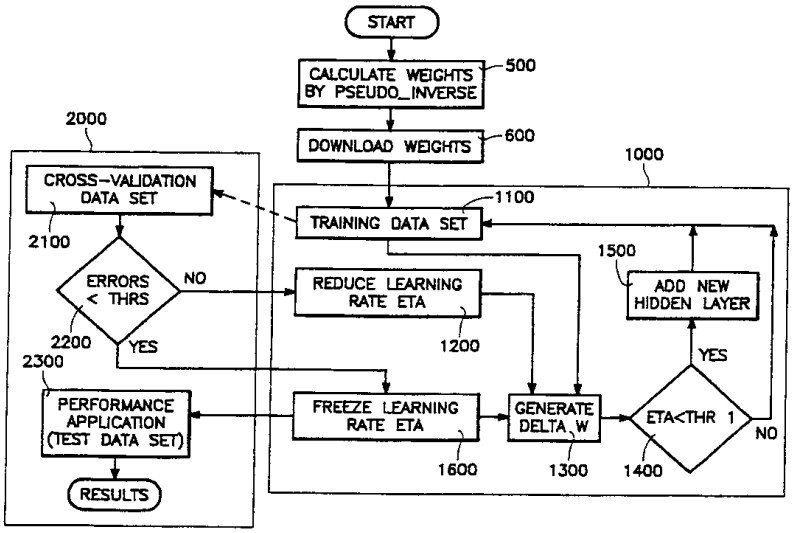
Artificial Neural Network with Hardware Training and Hardware Refresh

Duong, Tuan A., Inventor; January 28, 2003; 11 pp.; In English

Patent Info.: Filed 1 Oct. 1999; US-Patent-6,513,023; US-Patent-Appl-SN-412199; NASA-Case-NPO-19289-1-CU; No Copyright; Avail: CASI; A03, Hardcopy

A neural network circuit is provided having a plurality of circuits capable of charge storage. Also provided is a plurality of circuits each coupled to at least one of the plurality of charge storage circuits and constructed to generate an output in accordance with a neuron transfer function. Each of a plurality of circuits is coupled to one of the plurality of neuron transfer function circuits and constructed to generate a derivative of the output. A weight update circuit updates the charge storage circuits based upon output from the plurality of transfer function circuits and output from the plurality of derivative circuits. In preferred embodiments, separate training and validation networks share the same set of charge storage circuits and may operate concurrently. The validation network has a separate transfer function circuits each being coupled to the charge storage circuits so as to replicate the training network s coupling of the plurality of charge storage to the plurality of transfer function circuits. The plurality of transfer function circuits may be constructed each having a transconductance amplifier providing differential currents combined to provide an output in accordance with a transfer function. The derivative circuits may have a circuit constructed to generate a biased differential currents combined so as to provide the derivative of the transfer function. Official Gazette of the U.S. Patent and Trademark Office

Circuits; Neural Nets; Hardware; Artificial Intelligence



20030053379 NASA Pasadena Office, CA, USA

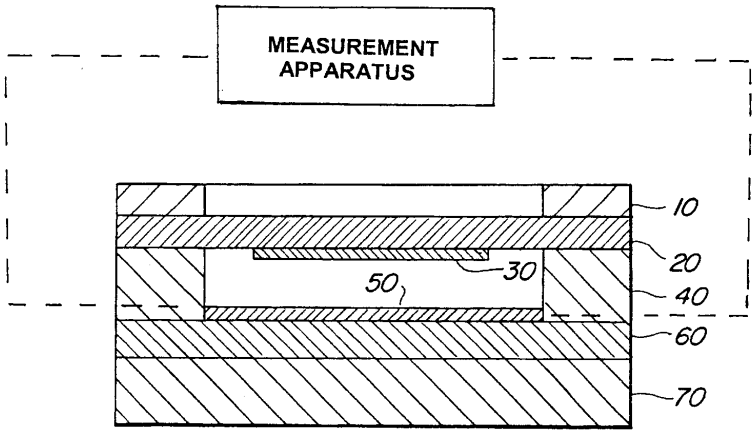
Ultra-Sensitive Magnetoresistive Displacement Sensing Device

Olivas, John D., Inventor; Lairson, Bruce M., Inventor; Ramesham, Rajeshuni, Inventor; January 14, 2003; 9 pp.; In English

Patent Info.: Filed 24 Aug. 1999; US-Patent-6,507,187; US-Patent-Appl-SN-384363; NASA-Case-NPO-20146-1; No Copyright; Avail: CASI; A02, Hardcopy

An ultrasensitive displacement sensing device for use in accelerometers, pressure gauges, temperature transducers, and the like, comprises a sputter deposited, multilayer, magnetoresistive field sensor with a variable electrical resistance based on an imposed magnetic field. The device detects displacement by sensing changes in the local magnetic field about the magnetoresistive field sensor caused by the displacement of a hard magnetic film on a movable microstructure. The microstructure, which may be a cantilever, membrane, bridge, or other microelement, moves under the influence of an acceleration a known displacement predicted by the configuration and materials selected, and the resulting change in the electrical resistance of the MR sensor can be used to calculate the displacement. Using a micromachining approach, very thin silicon and silicon nitride membranes are fabricated in one preferred embodiment by means of anisotropic etching of silicon wafers. Other approaches include reactive ion etching of silicon on insulator (SOI), or Low Pressure Chemical Vapor

Deposition of silicon nitride films over silicon substrates. The device is found to be improved with the use of giant magnetoresistive elements to detect changes in the local magnetic field.
Official Gazette of the U.S. Patent and Trademark Office
Displacement; Magnetoresistivity; Fabrication; Microelectromechanical Systems; Detection



Subject Term Index

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AIRFOILS
Airfoil Shaped Flow Angle Probe – 1

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