Cuadernos de Investigación

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de los equipos según su ubicación en la curva de Davies. Y la gestión de los repuestos según su clasificación PUSH, PULL o CPFR por demanda histórica.

Contacto
Luis Alberto Mora G. – lmora@eafit.edu.co
Grupo de Estudios en Mantenimiento Industrial (GEMI).

PONENCIA NACIONAL

MORA G., Luis Alberto
¿Dónde está el secreto de mantenimiento para poder alcanzar la máxima disponibilidad de los equipos, con plena confiabilidad y la mejor Mantenibilidad?
En: Congreso de Ingeniería Mecánica. Universidad Industrial de Santander. Noviembre 11 de 2010. Bucaramanga, Colombia.

Resumen
La gestión del departamento de mantenimiento se centra en asegurar la mayor disponibilidad de los equipos para la operación de las compañías. Asegurando la confiabilidad de estos durante su operación y brindando unos bajos tiempos de intervención en las tareas de mantenimiento. Todo esto al más bajo costo que asegure la calidad del trabajo.

El trabajo muestra indicadores de clase mundial y las técnicas y tácticas actuales que son aplicadas en la vida real industrial para mejorar los indicadores del departamento. Asociando la gestión al buen manejo de los inventarios de mantenimiento, para evitar demoras en la ejecución de las tareas. Partiendo de un adecuado pronóstico de demanda de los mismos a partir de la metodología universal de pronósticos.

Contacto
Luis Alberto Mora G. – lmora@eafit.edu.co
Grupo de Estudios en Mantenimiento Industrial (GEMI).

GRUPO DE INVESTIGACIÓN LABORATORIO DE CAD/CAM/CAE

PUBLICACIÓN INTERNACIONAL

CORREA, Jorge; RUIZ, Oscar; y DURANGO, Sebastian. Comments on "A novel technique for position analysis of planar compliant mechanisms, by Venanzi, P. Giesen and V. Parenti-Castelli".
En: Journal Mechanism and Machine Theory. Vol. 45 (5), 2010. page 811.
ISSN: 0094-114X.

Abstract
The Article "A novel technique for position analysis of planar compliant mechanisms, by Venanzi, P. Giesen and V. Parenti-Castelli. Mechanism and Machine Theory 40 (2005) pp. 1224-1239" contains numerical errors, which are corrected in this correction letter.

Contacto
Oscar Ruiz – oruiz@eafit.edu.co
Laboratorio CAD CAM CAE – EAFIT.

PUBLICACIÓN INTERNACIONAL

DURANGO, Sebastián; CALLE, Gabriel, RUIZ, Oscar. Analytical Method for the Kinetostatic Analysis of the Second-Class RRR Assur Group Allowing for Friction in the Kinematic Pairs.
En: Journal Of The Brazilian Society Of Mechanical Sciences And Engineering, v.32 (2010).
ISSN: 0100-7386.
Datos de indexación: SCOPUS

Abstract
The calculation of forces in the kinematic pairs of mechanisms by inverse dynamics is usually performed without friction considerations. In practice, when examination of articulated mechanisms takes into account friction, the solution of the inverse dynamics results in a complex procedure. If

a modular approach for the inverse dynamics is used, then exact solutions are available, but not necessarily are practical. For example, the analytical solution for a second-class first-type Assur group is a 16th degree equation. Previous researches proposed an approximated but practical (graphical) method to calculate the forces on the kinematic pairs taking into account the friction forces. In this article, an analytical interpretation of the Artobolevski approximated method is developed for the second-class Assur group with three rotational pairs. The final results for the reactions calculated with the implemented method present a good approximation with respect to the graphical solution. Future work should consider friction forces not only in second-class groups with rotational joints but in second-class groups with prismatic joints and high-class Assur groups.

Contacto
Oscar Ruiz – oruiz@eafit.edu.co
Laboratorio CAD CAM CAE – EAFIT.

PUBLICACIÓN INTERNACIONAL - Capítulo en libro

RUIZ, Oscar, CONGOTE, CADAVID, Carlos, LALINDE, Juan, PERIS, Guillermo, DEFEZ, Beatriz, SERRANO, Ricardo.
Gabriel-constrained, parameter – independent, curvature – sensitive parametric surface triangulations.
En: book "Recent Advances in Technologies", Maurizio A Strangio (Ed.). Editors: Intechweb.org. November 2009.
ISBN 978-953-307-017-9.

Abstract
The Boundary Representation of a 3D manifold contains FACES (connected subsets of a parametric surface S( ): R2 -> R3). In many science and engineering applications it is cumbersome and algebraically difficult to deal with the polynomial set and constraints (LOOPs) representing the FACE. Because of this reason, a Piecewise Linear (PL) approximation of the FACE is needed, which is usually represented in terms of triangles (i.e. 2-simplices). Solving the problem of FACE triangulation requires producing quality triangles which are: (i) independent of the arguments of S( ), (ii) sensitive to the local curvatures, and (iii) compliant with the boundaries of the FACE and (iv) topologically compatible with the triangles of the neighboring FACEs. In the existing literature there are no guarantees for the point (iii). This article contributes to the topic of triangulations conforming to the boundaries of the FACE by applying the concept of parameter-independent Gabriel complex, which improves the correctness of the triangulation regarding aspects (iii) and (iv). In addition, the article applies the geometric concept of tangent ball to a surface at a point to address points (i) and (ii). Additional research is needed in algorithms that (i) take advantage of the concepts presented in the heuristic algorithm proposed and (ii) can be proved correct.

Contacto
Oscar Ruiz – oruiz@eafit.edu.co
Laboratorio CAD CAM CAE – EAFIT.

PUBLICACIÓN NACIONAL

BARSCHKE Merlin, URIBE David, RUIZ Oscar, JENSEN Jens.
Finite Element Modeling of Composite Materials using Kinematic Constraints.
En: Revista Ingenieria y Ciencia. Volumen 5, número 10, diciembre de 2009, páginas 133–153.
ISSN 1794-9165
Datos de indexación: Categoría B Colciencias – Base de datos: Publindex, Latindex, Thomson Gale, EBSCO, DialNET, Redalyc, Inspec

Abstract
The purpose of this article is to present computer simulations of composite materials based not in experimental data (however necessary in a future work) but on kinematic constraints introduced among the fibers themselves and between the fibers and the surrounding resin. The authors claim that, because the high computational expenses, the kinematic constraints have not been until now fully exploited

in the geometric modeling of composite materials. The purpose of this paper is to demonstrate the implementation and results of such a modeling. The paper does not include laboratory results as it confines itself to Finite Element Analysis implementation of the prescribed constraints. Closed analytical descriptions of layered composite material behavior are strongly restricted [Savithri and Varadan 1992]. Many approaches to describe layered composite materials are based on C1 Z and C0 Z function theories such as the Classical Laminate Theory [CLT] [Donadon and Falzon 2006], [Rohwer and Friedrichs 2004]. These function theories contain strong simplifications of the material, especially for woven fiber composite materials. A hybrid approach to model textile composite materials in Finite Element Analysis [FEA] was developed by Sidhu and Averill [2001] and adopted for woven commingled glass-polypropylene composite materials by Li and Sherwood [2004]. In this paper two hybrid FEA models of woven fiber reinforced composite material are developed and compared. A method to obtain values for the material properties from these models is introduced. These values are used to simulate the woven fiber reinforced material using layered elements in the FEA software ANSYS. The hybrid FEA model introduced in this paper requires a smaller number of simplifications compared to methods based on C1 Z and C0 Z function theories. Unlike the model of Li and Sherwood the woven pattern of the material is geometrically simulated. Resultant a two layer plate model is shown which numbers of displacement deviate less that two percent from these of the developed hybrid plate models. By applying the layered elements on the model of a hand it is shown that this approach is ap- propriate to model complex 3D structures. In the future the method to obtain the material properties from the hybrid FEA model is to be advanced. Nonlinear material properties are to be included in the hybrid FEA models and the developed models are to be compared with experiments on the real material.

Contacto
Oscar Ruiz – oruiz@eafit.edu.co
Laboratorio CAD CAM CAE – EAFIT.

PONENCIA INTERNACIONAL

CONGOTE, John, BARANDIARAN, Iñigo, BARANDIARAN, Javier, MONTSERRAT, Tomas, QUELEN, Julien, FERAN, Christian, MINDAN, Pere, MUR, Olga, TARRES, Francesc, RUIZ, Oscar.
Real-time depth map generation architecture for 3D videoconferencing.
En: 3DTV-CON2010 Conference on Capture, Transmission and Display of 3D Video. June 7-9 2010, Tampere, Finland.
Datos de indexación: ISI, SCOPUS.

Abstract
In this paper we present a reliable depth estimation system which works in real-time with commodity hardware. The system is specially intended for 3D visualization using autoestereoscopic displays. The core of this work is the development of highly optimized GPU based algorithms allowing accurate and stable depth map generation. Our approach overcomes typical problems of live depth estimation systems such as depth noise and flickering. These algorithms are integrated within the versatile GStreamer multimedia software platform.

Accurate depth map estimation together with real-time performance make the system suitable for 3D videoconferencing.

Contacto
Oscar Ruiz – oruiz@eafit.edu.co
Laboratorio CAD CAM CAE – EAFIT.

PONENCIA INTERNACIONAL

CONGOTE, John, MORENO, Aitor, BARANDIARAN, Iñigo, BARANDIARAN, Javier, POSADA, Jorge, RUIZ, Oscar. Marching Cubes in an Unsigned Distance Field for Surface Reconstruction from Unorganized Point Sets.
En: GRAPP-2010. International Conference on Computer Graphics Theory and Applications. Angers, France, May 17-21, 2010.
ISBN: 978-989-674-026-9, pp: 143-147.
Datos de indexación: SCOPUS.

Abstract
Surface reconstruction from unorganized point set is a common problem in computer graphics. Generation of the signed distance field from the point set is a common methodology for the surface reconstruction. The reconstruction of implicit surfaces is made with the algorithm of marching cubes, but the distance field of a point set can not be processed with marching cubes because the unsigned nature of the distance. We propose an extension to the marching cubes algorithm allowing the reconstruction of 0-level iso-surfaces in an unsigned distance field. We calculate more information inside each cell of the marching cubes lattice and then we extract the intersection points of the surface within the cell then we identify the marching cubes case for the triangulation. Our algorithm generates good surfaces but the presence of ambiguities in the case selection generates some topological mistakes.

Contacto
Oscar Ruiz – oruiz@eafit.edu.co
Laboratorio CAD CAM CAE – EAFIT.

PONENCIA INTERNACIONAL

CONGOTE, John, BARANDIARAN Javier, BARANDIARAN Iñigo, RUIZ, Oscar.
Realtime Dense Stereo Matching with Dynamic Programming. in CUDA.
En: XIX Spanish Congress of Graphical Informatics (CEIG 2009).. Sección Española de Eurographics (EGse)). Pp 231-234. September 2009. Donostia – San Sebastian, Spain.
ISBN 978-3-905673-72-2

Abstract
Real-time depth extraction from stereo images is an important process in computer vision. This paper proposes a new implementation of the dynamic programming algorithm to calculate dense depth maps using the CUDA architecture achieving real-time performance with consumer graphics cards. We compare the running time of the algorithm against CPU implementation and demonstrate the scalability property of the algorithm by testing it on different graphics cards.

Contacto
Oscar Ruiz – oruiz@eafit.edu.co
Laboratorio CAD CAM CAE – EAFIT.

PONENCIA INTERNACIONAL

CONGOTE, John, BARANDIARAN Iñigo, BARANDIARAN Javier, RUIZ, Oscar.
ADAPTATIVE CUBICAL GRID FOR ISOSURFACE EXTRACTION.
En: GRAPP 2009 – Fourth International Conference on Computer Graphics Theory and Applications. pp 21-26. Feb 5-8, 2009, Lisbon, Portugal. INSTICC, ACM SIGGRAPH, EuroGraphics.
ISBN: 978-989-8111-67-8.

Abstract
This work proposes a variation on the Marching Cubes algorithm, where the goal is to represent implicit functions

with higher resolution and better graphical quality using the same grid size. The proposed algorithm displaces the vertices of the cubes iteratively until the stop condition is achieved. After each iteration, the difference between the implicit and the explicit representations are reduced, and when the algorithm finishes, the implicit surface representation using the modified cubical grid is more detailed, as the results shall confirm. The proposed algorithm corrects some topological problems that may appear in the discretisation process using the original grid.

Contacto
Oscar Ruiz – oruiz@eafit.edu.co
Laboratorio CAD CAM CAE – EAFIT.

PONENCIA INTERNACIONAL

DURANGO, Sebastián, RESTREPO, David, RUIZ, Oscar, RESTREPO, John, ACHICHE, Sofiane.
Kinematic Identification of Parallel Mechanisms by a Divide and Conquer Strategy.
En: 7th International Conference in Informatics in Control, Automation and Robotics – ICINCO 2010, Portugal, 15 -18 June, 2010.
Datos de indexación: SCOPUS.

Abstract
This paper presents a Divide and Conquer strategy to estimate the kinematic parameters of parallel symmetrical mechanisms. The Divide and Conquer kinematic identification is designed and performed independently for each leg of the parallel mechanism. The estimation of the kinematic parameters is performed using the inverse calibration method. The identification poses are selected optimizing the observability of the kinematic parameters from the Jacobian identification matrix. With respect to traditional identification methods the main advantages of the proposed Divide and Conquer kinematic identification strategy are: (i) reduction of the kinematic identification computational costs, (ii) improvement of the numerical efficiency of the kinematic identification algorithm and, (iii) improvement of the kinematic identification results. The contributions of the paper are: (i) The formalization of the inverse calibration method as the Divide and Conquer strategy for the kinematic identification of parallel symmetrical mechanisms and, (ii) a new kinematic identification protocol based on the Divide and Conquer strategy. As an application of the proposed kinematic identification protocol the identification of a planar 5R symmetrical mechanism is (virtually) developed. The performance of the calibrated mechanism is evaluated by updating the kinematic models with the estimated parameters and developing kinematic simulationsy.

Contacto
Oscar Ruiz – oruiz@eafit.edu.co
Laboratorio CAD CAM CAE – EAFIT.

PONENCIA INTERNACIONAL

RESTREPO, David, ACOSTA, Diego,
DURANGO, Sebastian, RUIZ, Oscar.
Design Of Computer Experiments Applied To Modeling Compliant Mechanisms.
En: TMCE-2010, International Symposium on Tools and Methods of Competitive Engineering, en Abril 12 – 16, 2010, Ancona, Italia. pp 775-788.
ISBN 978-90-5155-060-3 (Books), ISBN 978-90-5155-061-0 (CD).

Abstract
This article discusses a procedure for modeling compliant mechanisms by using Computer Experiment Design methodology. This approach produces an input-output metamodel that is suited for real-time control of compliant mechanisms. The term metamodel is used to represent a simplified and efficient mathematical model of unknown phenomenon or computer codes. The metamodeling of compliant mechanisms is performed from virtual experiments based on factorial and space filling design of experiments. The procedure is used to modeling the quasi-static behavior of the HexFlex compliant mechanism. The HexFlex is a parallel compliant mechanism for nano-manipulating that allows six degrees of freedom of its moving stage. The metamodel of the HexFlex is performed

from virtual experiments by the Finite Element Method (FEM). The obtained metamodel for the HexFlex is linear for the movement range of the mechanism. Simulations of the metamodel were conducted, finding good accuracy with respect to the virtual experiments.

Contacto
Oscar Ruiz – oruiz@eafit.edu.co
Laboratorio CAD CAM CAE – EAFIT.

BACHELLORS THESIS

Geometry Generation for Computer Aided Engineering. Study Cases in Meshing and Ceramics Modeling. October 2009. student Ricardo Serrano. Supervisor Oscar Ruiz. EAFIT University, Medelin, COLOMBIA.

Contacto
Oscar Ruiz – oruiz@eafit.edu.co
Laboratorio CAD CAM CAE – EAFIT.

BACHELLORS THESIS

Experiment Design in Compliant Mechanisms and Kinematic Identification of Parallel Mechanisms. May 2010. student David Restrepo.
Supervisor Oscar Ruiz. EAFIT University, Medelin, COLOMBIA.

Contacto
Oscar Ruiz – oruiz@eafit.edu.co
Laboratorio CAD CAM CAE – EAFIT.

MASTERS THESIS

Applications of Computational Geometry to Computer Aided Design, Computer Graphics and Computer Vision. Master Student John Edgar Congote Calle. Advisor: Prof. Oscar E. Ruiz. Meritory Thesis Award (Informatics) EAFIT University, June 2009

Contacto
Oscar Ruiz – oruiz@eafit.edu.co
Laboratorio CAD CAM CAE – EAFIT.