

3D SIMULATION IN THE ADVANCED ROBOTIC DESIGN, TEST AND CONTROL

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Abstract

In the paper an overview about modern visualization approaches in the field of telerobotics and interactive robotics simulation is presented. The role of 3D simulation in the advanced robotic design, test and control is highlighted. We present an overview about the advanced graphics techniques in semi- or true 3D. We have made a comparison presenting the advantages and disadvantages between the (binocular) anaglyph and the (monocular) motion stereo methods in our robot simulator application. 13 refs.
(Accepted by previous Editorial Team.)

Key Words: *Mobile Robot Simulation, 3D Visualization Methods, RobotMAX Simulator*

A FINITE ELEMENT DEVELOPMENT FOR BALL BEARING NONLINEAR STIFFNESS MODELIZATION

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Abstract

A formulation and algorithmic treatment of a three-dimensional bearing stiffness is presented. This stiffness formulation is based on the non-linear equilibrium balance of forces and moments on the rolling elements, in a ball bearing, exerted by the inner and the outer races including contact forces. Newton-Raphson Method is used to solve the resulting non linear equation system. A non-linear two nodes finite element linking up a node of the inner race to another node of the outer race is developed. The tangent stiffness matrix of this element is deduced from the Jacobean of the convergent equilibrium. A numerical study is presented showing the influence of some parameters variation and the coupling between all stiffness terms. 14 refs.
(Accepted by previous Editorial Team.)

Key Words: *Ball Bearing, Finite Element Method, Stiffness Matrix, Newton-Raphson Method*

A SIMULATOR FOR HELPING IN DESIGN OF A NEW ACTIVE CATHETER DEDICATED TO COLOSCOPY

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Abstract

In the paper a dynamical simulator of an active micro-catheter for coloscopy is presented. A brief description of a real prototype is proposed and outlined the interest of designing a training simulator. The techniques of virtual prototyping aimed at improving the quality of the developed prototypes. The quality of the model was evaluated by an objective function. In order to minimise the objective function, which leads to a better device, different optimization approaches by genetic algorithms have been used. A simulator based on a mechanical description of the device and on the interacting environment allows computing the progression of a poly-articulated endoscope. 21 refs.
(Accepted by previous Editorial Team.)

Key Words: *Dynamical Simulator, Catheter, Genetic Algorithms, Optimisation*

SIMULATION OF A MULTI-ROBOT BASED ASSEMBLY SYSTEM

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Abstract

Scope of this paper is to present current development of the Bionic Assembly System and simulation of a simplified system in Webots software. In this paper we present the hardware design and design of controller for mobile manipulator and a design of transport mobile robot behaviour. The simulation is done with all kinematical and dynamical characteristics of each component, i.e. with physics. Results presented are just a base for starting to develop a simulation of a whole Bionic Assembly System and to test the concept of a system and ideas. 9 refs.

Key Words: *Multi-Robot System, Assembly, Self-Organisation, Simulation*