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SIMULATION AND MODELLING OF THE VIBRATION EFFECT ON THE HOLE FORM IN DRILLING

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Abstract
The vibration phenomenon represents the cause of many problems in metal cutting processes. It has a big influence on the quality of the machining operation, tool life and machine precision. Drilling operation is a common metal cutting process where quality of the hole form is often a critical issue. Therefore, it was necessary to predict these vibrations.
The first part of this paper deals with modelling and writing equation of motion of a two freedom degrees system for drilling operation. Then, in the second part, we develop a numerical resolution of the governing equation (nonlinear and delayed differential equation) using Newmark Method combined with Newton-Raphson Method.
Numerical results of this study have also been shown and comment upon: thrust force and torque (parametrical study in static way), dynamical responses, dynamical cutting force, hole form simulation with amplified vibration amplitude (amplification 1000 time). 19 refs.
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Key Words: *Drilling Vibrations, Simulation, Vibratory Behaviour, Hole Form Prediction*

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COLLISION-FREE TRAJECTORY PLANNING FOR MANIPULATORS USING GENERALIZED PATTERN SEARCH

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Abstract
A Generalized Pattern Search algorithm (GPS) is introduced to design a collision-free trajectory for planar redundant manipulators. Cubic-spline interpolation trajectory for the end-effector is designed a priori by selecting three intermediate points around the workspace obstacles. The GPS algorithm ensures that none of the selected points lies inside any of the obstacles. The end-effector will follow the prescribed trajectory in excellent manner without colliding with the obstacles. Simulation studies are carried out for three different obstacles to prove the validity of the proposed algorithm. 16 refs.
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Key Words: *Redundant Manipulator, Genetic Algorithms, Generalized Pattern Search, Obstacle Avoidance, Cubic-Spline, Optimization*

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OPTIMIZATION OF A NUMBER OF CONTAINERS FOR ASSEMBLY LINES: THE FIXED-COURSE PICK-UP SYSTEM

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Abstract
A heuristic procedure is proposed to determine the optimal number of containers holding parts used on the assembly lines. A complex number of piece parts are supplied in terms of a fixed-course pick-up system. The carrier travels between a parts-storages area and the assembly lines repeatedly; hence it is called “Mizusumashi” (the whirligig beetle). On the assembly lines, the parts-container is put on racks so that the operator may pick up the specific parts to assemble products. The characteristics of the Mizusumashi system are described and the equation to obtain the expected number of parts-container size is presented. From this, a heuristic procedure using simulation to determine the optimal number of parts-container is proposed. In addition, this procedure is applied to a real manufacturing system, and the proposed procedure is found to be effective and powerful especially from the practical standpoint. 14 refs.
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Key Words: *Just-In-Time Manufacturing, Optimization, Heuristics, Work-In-Process Inventory, Mizusumashi (Fixed-Course Pick-Up) System*

Pages 167-173

BEST MULTIPLE-VIEW SELECTION FOR THE VISUALIZATION OF URBAN RESCUE SIMULATIONS

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Abstract
In this paper we address the problem of automatically computing a set of views over a simulated three dimensional environment. The viewing system aims at, for each moment, supplying the user with the most pertinent information in order to allow a good understanding of the evolving environment. Our approach relies on an innovative optimization architecture that enables intelligent optimization techniques based on simulated annealing and genetic algorithms. Reported experiments were performed in urban rescue scenarios from the RoboCup Rescue Domain. We outline the possible extension of the proposed architecture to other visualization problems and argue on how several problems within the fields of Visualization and Rendering can benefit from it. 19 refs.
(Adapted paper from the International Symposium CompIMAGE – Coimbra, Portugal, 20-21 October 2006.)

Key Words: *Set of Views, Selection, Optimization Technique, Simulated Environment, Urban Rescue Scenarios, Visualization Problems*