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AN IMPROVEMENT OF A CELLULAR MANUFACTURING SYSTEM DESIGN USING SIMULATION ANALYSIS

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Abstract
Cell Formation (CF) problem involves grouping the parts into part families and machines into manufacturing cells, so that parts with similar processing requirements are manufactured within the same cell. Many researches have suggested methods for CF. Few of these methods; have addressed the possible existence of exceptional elements (EE) in the solution and the effect of correspondent intercellular movement, which cause lack of segregation among the cells. This paper presents a simulation-based methodology, which takes into consideration the stochastic aspect in the cellular manufacturing (CM) system, to create better cell configurations. An initial solution is developed using any of the numerous CF procedures. The objective of the proposed method which provides performances ratings and cost-effective consist in determine how best to deal with the remaining EE. It considers and compares two strategies (1) permitting intercellular transfer and (2) exceptional machine duplication. The process is demonstrated with a numerical example. 32 refs.
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Key Words: *Cell Formation, Exceptional Elements, Simulation, Alternative Costs, Improvement*

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AGENT-BASED SIMULATION OF A SHOP FLOOR CONTROLLER USING HYBRID COMMUNICATION PROTOCOLS

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Abstract
Agents are autonomous and computational entities that perceive their environment through sensors and act upon their environment through effectors. Application of agents in simulation of manufacturing system helps in modelling the concurrent behaving entities close to the real system. A manufacturing agent should be modelled to impart the required functionality to the manufacturing entity. As agents are autonomous, they run asynchronously and need to be synchronized with the simulation clock for simulating the manufacturing system. This paper deals with the synchronization of manufacturing agents, working of the agent-based simulator of a shop floor controller for a sample manufacturing system and the hybrid communication protocols involved during simulation. The manufacturing agents were built on JADE™ platform, which is a leading multi agent development framework that helps in developing FIPA compliant agent-based systems. Agent-based modelling and simulation of entities in the manufacturing system provides flexibility for real-time decision making. 13 refs.
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Key Words: *Agent-Based Simulation, Agent-Based Manufacturing System (ABMS), Communication Protocols, Foundation for Intelligent Physical Agents (FIPA), Java Agent DEvelopment Framework (JADE™)*

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NOVEL RHEOLOGICAL MODEL FOR THE INELASTIC BLOOD RHEOLOGY: ITS DERIVATION AND VALIDATION

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Abstract
A novel approach to rheological modelling of human blood is proposed. The fundamental equation relating the apparent wall shear rate to the wall shear stress is used to derive the general relationship between the shear stress and the shear rate. Then the Parabolic model is tested against available experimental data for blood and compared to the well known and widely used Power law. Numerical analysis of non-Newtonian (blood) as well as Newtonian fluid flow in common carotid geometry is used to compare numerical results with theoretical expressions for validation of Parabolic model. 22 refs.
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Key Words: *Blood Rheology, Shear-Thinning Fluid, Parabolic Model, Numerical Modelling*

Pages 230-241

ANALYSIS OF NON-STOP TRAFFIC AT ISOLATED SIGNALISED INTERSECTION BY MEANS OF DISCRETE EVENT SIMULATION

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Abstract
This paper includes a simulation-based analysis of non-stop traffic at isolated signalised intersections. A Min-Max traffic control method is proposed to replace conventional traffic signals and maintain a continuous traffic flow. The method applicability is tested by means of Discrete Event Simulation (DES) using AutoMod software package. A set of quantitative Measures of Performance (MOP) is used to demonstrate the benefits of the proposed method compared to conventional traffic signals. In addition to eliminating vehicles stoppages, simulation results of the proposed method showed improvement in the overall traffic flow by reducing vehicle average travel time, average delay time, and the average number of vehicles at the intersection. The proposed method can be adapted to suit other types of traffic intersections and flow patterns and conditions. 22 refs.
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Key Words: *Traffic Control, Discrete Event Simulation, Continuous Flow Intersections*