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A NEW MODEL FOR SYNCHRONOUS MULTI AGENTS PRODUCTION AMONGST CLIENTS AND SUBCONTRACTORS

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Abstract
In this paper a new Product Model (PM) for production is presented. An agent able to negotiate the operations that the product must undergo on the stations in manufacturing is attached to it. That agent has all the necessary information concerning its manufacturing range, the environment of production, the objectives, and the constraints and rules of production. The PM was introduced into a common experimental platform developed by the partners of the "Synchronous Production Amongst Clients and Subcontractors" (SPACS) Project. The latter integrates all the elements necessary for the management of the production in interaction with the Electronic Data Interchanges (EDI) amongst clients and subcontractors. A new approach for manufacturing systems' control, allowing increased reactivity and flexibility, is also proposed. It is based on a social approach with a totally decentralized architecture. The manufacturing system (MS) is made up of a set of autonomous and intelligent agents as in a society. The product is considered as an actor who takes part in the decisions. The products are likened to customers and the resources to service providers. 15 refs.
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Key Words: *Product Model, Scheduling, Multi-agent System, Manufacturing Systems*

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HONEY-BEES OPTIMIZATION ALGORITHM APPLIED TO PATH PLANNING PROBLEM

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Abstract
Autonomous systems assume intelligent behaviour with capabilities of dealing in complex and changing environments. Problem of path planning, which can be observed as an optimization problem, seems to be of high importance for arising of intelligent behaviour for different real-world problem domains. Swarm intelligence has gained increasingly high interest among the researchers from different areas, like, science, commerce and engineering over the last few years. It is particularly suitable to apply methods inspired by swarm intelligence to various optimization problems, especially if the space to be explored is large and complex. This article presents application of Honey-bees mating algorithm (HBO) to a non linear Diophantine equation benchmark problem and comparison with results of a genetic algorithm (GA) designed for the same purpose. In second part of the work, HBO algorithm is applied to solve a problem of guidance of mobile robot through the space with differently shaped and distributed obstacles. Fuzzy fitness function for selective evaluation of paths found by the algorithm is proposed. The performance of the algorithm is comparable to genetic algorithm developed for the same purpose. 15 refs.
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Key Words: *Swarm Intelligence, Mobile Robot, Optimization, Path Planning, Obstacles*

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INTEGRATION OF SIMULATION SOFTWARE ARENA WITH FMS CONTROL SYSTEM

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Abstract
Simulation software enables to build and process FMS models to analyse different aspects of the system operation. Such models, verified in simulation experiments, are ready to be used for FMS control to calculate control decisions. The idea of using simulation software Arena to control FMS is presented in the paper. Basic characteristic of modelling and simulation in Arena is presented. Arena real time module, which enables communication with external applications when the model is processed, is characterized. Required configuration options for Arena and the model are presented. To integrate Arena with local controllers of the FMS a computer program is designed. The proposed solution is implemented and verified for a real system. 15 refs.
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Key Words: *Modelling, Simulation, FMS Control*

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REDUCED ORDER MODELLING OF LINEAR MIMO SYSTEMS USING GENETIC ALGORITHM

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Abstract
In this paper, an algorithm for order reduction of linear multivariable systems is proposed using the combined advantages of the dominant pole retention method and the error minimization by Genetic algorithm. The denominator of the reduced order transfer function matrix is obtained by retaining the dominant poles of the original system while the numerator terms of the lower order transfer matrix are determined by minimizing the integral square error in between the transient responses of original and reduced order models using Genetic algorithm. Each element of the transfer function matrix of the original system is considered separately. The reduction procedure is simple and computer oriented. The proposed algorithm guarantees stability of the reduced order transfer function matrix if the original high order system is stable and is having superior features, including easy implementation and good computational efficiency. The proposed algorithm has been applied successfully to the transfer function matrix of a 10th order two-input two-output linear time invariant model of a practical power system. The performance of the algorithm is tested by comparing the relevant computer simulation results. 32 refs.
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Key Words: *Dominant Pole, Genetic Algorithm, Order Reduction, Power System*