

**TOWARDS A METAMODEL FOR EXTENDED QUEUING NETWORKS**

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**Abstract**

This paper focuses on the development of EQNM<sup>2</sup>L which is an extended queuing modelling and markup language. We discuss the DSML metamodel and its XML-based exchange format which represent the cornerstone of the development process. EQNM<sup>2</sup>L enhances interoperability between a wide range of analytical solvers and simulation tools dealing with systems performance evaluation and based on the extended queuing theory. Furthermore, the Model Driven Engineering approach allows automatic generation of modelling environments and simulation/analytical codes which improve productivity and quality. Our aim is to induce discussion on and contributions for elaborating the whole metamodel and providing a starting point for the development of a standard inter-change format. 19 refs.

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**Key Words:** *Extended Queuing Systems, Metamodelling, Domain Specific Modelling Language, Discrete Event Simulation, Interoperability*

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**COMPARISON OF DISPATCHING RULES IN JOB-SHOP SCHEDULING PROBLEM USING SIMULATION: A CASE STUDY**

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**Abstract**

Industries nowadays must be able to quickly adapt with the customer and improve product quality to survive in the competitive edge. Job shop scheduling is crucial in the manufacturing world and exists within most manufacturing sectors. In the manufacturing world, scheduling problems are extensively implementing the dispatching rules. The procedures are designed to provide good solutions to complex problems in real-time. This paper describes the importance of dispatching rules in improving the performance of the factory. This study evaluates total of 44 dispatching rules with the classification of hybrid and single rules. The performance of each rule compared and summarized to determine the final ranking for all the different dispatching rules. The result shown that MTWR (Most Total Work Remaining) rule performs well in almost all measurements as well as hybrid dispatching rules is not generating the best rules compared to single dispatching rule. A set of data from an automotive industry use to simulate the job-shop production floor. 25 refs.

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**Key Words:** *Job Shop, Dispatching Rules, Simulation, ARENA*

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**MAGNETIC DEVICE SIMULATION MODELLING AND OPTIMISATION FOR SCALE CONTROL**

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**Abstract**

The paper presents model devices for magnetic water treatment, optimized for scale control at water capacities up to a few m<sup>3</sup>/h. Different arrangements of permanent magnets were investigated and simulated at different water-flow capacities to yield the proper magnetic field distribution and the required magnetic flux density, using the computational program OPERA 15R1 (Vector Fields Software) with the finite-element method, considering the real 3D-geometry, non-linearity of magnetic properties of construction materials, and the interaction of neighbouring poles. 24 refs.

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**Key Words:** *Magnetic Water Treatment, Magnetic-Field Simulation, Three-Dimensional Model*

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**SIMSUM1: A GENERAL OPTIMISATION VIA SIMULATION APPROACH FOR 0-1 PROGRAMMING MODELS**

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**Abstract**

The current study develops a new general heuristic approach to address a special class of combinatorial problems, efficiently. The approach combines discrete event simulation together with relaxation techniques to solve a special class of 0-1 programming models including a constraint that restricts the summation of all variables to be 1. Three well-known combinatorial problems -including such a constraint- such as Dynamic Facility Layout Problem (DFLP), Graph Labelling Problem (GLP) and Travelling Salesman Problem (TSP) have been addressed and could be solved efficiently by the proposed algorithm. Several experiments have been carried out to show the efficiency of the algorithm. The results show that the proposed algorithm can be used for several real world applications while according to the best knowledge of the author, at least for DFLP and GLP, it is the fastest algorithm which has been developed in the literature. 34 refs.

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**Key Words:** *Discrete Event Simulation, Dynamic Facility Layout Problem, Graph Labelling Problems, Travelling Salesman Problem, Zero-One Programming*