

**RECONFIGURABLE MODELLING WITH DEADLOCK AVOIDANCE FOR THE CLINICAL PATHWAY BASED ON MCPN-CS**

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**Abstract**

Clinical Pathway (CP) is very complicated and has many exceptional variations. Generally, its treatment course and control steps cannot be totally predefined. Meanwhile, the CP embodies the "Re-flow" therapy features, which is very hard to model, control and manage. Therefore, combined modular modelling method and structure changing mechanisms, a Modular Coloured Petri Net with changeable structure (MCPN-CS) workflow modelling method is proposed. Aimed at the variations of the CP, the workflow model for the CP can be reconfigured dynamically by using the mechanisms of change-by-modification (CBM) and change-by-composition (CBC). A case study on a workflow modelling of osteosarcoma CP is constructed and the modelling is analyzed by proposed deadlock detection algorithms (DDA). The result validates that the proposed method may noticeably enhance the flexibility, adaptation, reusability and maintainability of the workflow model for the CP. 22 refs.

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**Key Words:** *Clinical Pathway (CP), Workflow Modelling, MCPN-CS, Changeable Structure, Deadlock Detection*

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**MODELLING OF TOOL LIFE, TORQUE AND THRUST FORCE IN DRILLING: A NEURO-FUZZY APPROACH**

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**Abstract**

This paper presents the application of neuro-fuzzy approach for modelling tool life, torque and thrust force in drilling operation for set of given process parameters, namely cutting speed, feed rate and drill diameter. The proposed approach uses a hybrid-learning algorithm i.e., combination of the back-propagation gradient descent method and least squares method, to identify premise and consequent parameters of the first-order Sugeno-fuzzy inference system. The least square method is used to optimize the consequent parameters with the premise parameters fixed. Once the optimal consequent parameters are found, the back-propagation algorithm gradient descent method is used to adjust optimally the premise parameters corresponding to the fuzzy set in the input domain. The predicted tool life, torque and thrust force values obtained from neuro-fuzzy system were compared with the experimental data. This comparison indicates that the proposed approach can produce optimal knowledge base of fuzzy system for predicting tool life, torque and thrust force in drilling operation. 18 refs.

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**Key Words:** *Tool Life, Torque, Thrust Force, Neuro-Fuzzy Approach, Drilling*

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**MATHEMATICAL MODEL OF A VAPOUR ABSORPTION REFRIGERATION UNIT**

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**Abstract**

By means of carefully devised assumptions, a simple linear model is presented for an absorption refrigeration unit employing either water-lithium bromide or ammonia-water refrigerant-absorbent pairs. Absorption systems are an alternative to vapour compression systems by being thermally activated. Such heat energy may come from the sun or even from hot exhaust gases from a particular engineering process. A thorough investigation of the optimal operating temperatures is necessary to ensure effective operation of the system. By means of this simulation, the system response to varying absorber, generator and condenser temperatures was analyzed. 9 refs.

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**Key Words:** *Refrigeration, Absorption Systems, Water-Lithium Bromide, Ammonia-Water*

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**SCREENING ALEXANDRIA PORT SIMULATION MODEL BY USING SEQUENTIAL BIFURCATION PROCEDURE**

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**Abstract**

Screening simulation experiments is intended to eliminate unimportant factors from a simulation model. It usually results in a short list of important factors, so that effort may be concentrated upon this list. Sequential bifurcation (SB) procedure, developed by Bettonvil and Kleijnen, is a screening method that has proved to be efficient and effective. In this study, the SB procedure is used to determine the most important factors of the port of Alexandria, Egypt simulation model. Sixteen out of 44 factors are considered important. In addition, Cioppa procedure is used to verify that the assumed unimportant factors by the SB procedure are really unimportant. This procedure is used to confirm that the suspected non-influential (unimportant) factors do not significantly affect the response output of interest. This procedure emphasized that the set of unimportant factors determined by the SB procedures is really unimportant. 19 refs.

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**Key Words:** *Simulation, Screening, Sequential Bifurcation*