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Evolutionary Optimization of the Operation of Pipeless Plants with Variable Transfer Times

By Sabine Piana

Shaker Verlag Nov 2012, 2012. Taschenbuch. Condition: Neu. Neuware - Pipeless plants are an innovative batch production system in which the chemical substances are transported in mobile vessels between fixed processing stations. They are characterized by a reduced cleaning effort and by a high degree of flexibility. The parallel handling of several batches leads to shorter production times. The optimal operation of a pipeless plant is a highly complex combinatorial planning and scheduling problem. Decisions have to be made on the sequencing and timing of the batches, on the assignment of the equipment, and on the collision-free routing of the mobile vessels. The processing duration of an operation may depend on the chosen equipment and on the duration of the routing of the vessels. A method that finds near-optimal but yet highly accurate and feasible schedules taking into account the specific characteristics of the pipeless plant was missing in previous research. This thesis proposes a simulation-optimization framework that unites a problem-specific evolutionary algorithm (EA) with a discrete event simulator. It is the first optimization approach for pipeless plants that is based on a detailed plant model, which considers the schedule-dependent routing of the mobile vessels, and the variable durations of...



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