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## A bi-level evolutionary optimization approach for integrated production and transportation scheduling

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### Abstract

This paper investigates an integrated production and transportation scheduling (IPTS) problem which is formulated as a bi-level mixed integer nonlinear program. This problem considers distinct realistic features widely existing in make-to-order supply chains, namely unrelated parallel-machine production environment and product batch-based delivery. An evolution-strategy-based bi-level evolutionary optimization approach is developed to handle the IPTS problem by integrating a memetic algorithm and heuristic rules. The efficiency and effectiveness of the proposed approach is evaluated by numerical experiments based on industrial data and industrial-size problems. Experimental results demonstrate that the proposed approach can effectively solve the problem investigated.

**Keywords:** Supply chain scheduling; Production and distribution; Bi-level programming; Bi-level evolutionary algorithm

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