Abstract:
This paper presents a bidirectional coupling concept between mathematical optimization and process simulation applied to earthwork processes in road construction projects. Considering these two techniques apart, each one has limitations in itself. On the one hand, process simulation focuses on modeling process activities and their dependencies on a very detailed, microscopic level. It helps the constructor to calculate the approximate processing time according to the resources involved. On the other hand, mathematical optimization can be used to determine cost-efficient assignments of cut and fill areas from the point of view of their capacities and distances using a graph-based approach and a linear programming technique on a macroscopic level. The proposed coupling concept establishes a bidirectional link between these two approaches in order to create a new framework which benefits from the advantages of both approaches and avoids the weaknesses of each individual approach. To do so, it is essential to modify the graph-based optimization model to capture information from the simulation results and to specify the common coupling parameter sharing on both sides. Test cases at the end of this paper show that the coupling framework achieves the best results in terms of reducing earthwork processing times compared with other stand-alone approaches.

Stichworte:
bidirectional coupling, earthwork, optimization, simulation, road construction
Occurences:

- Einrichtungen > Fakultäten > Ingenieurfakultät Bau Geo Umwelt > Lehrstühle > Leonhard Obermeyer Center > Lehrstuhl für Computation in Engineering (Prof. Rank) > Konferenzbeiträge > Proceedings

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