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Titel des Beitrags: Comparing a Graph-Grammar Approach to Genetic Algorithms for Computational Synthesis of PV Arrays

Abstract: The research presented in this paper compares two different computational approaches to topology synthesis: graph grammars (GG) and a genetic algorithm (GA). Both are applied to the domain of solar panel networks, which are configured to maximize power under a variety of sunlight conditions. Networks mostly connected in series create high voltages but are susceptible to shading. On the other hand, highly parallel topologies tend to create too low voltages. Thus, there is an opportunity to optimize PV array topologies given sunlight conditions. The paper describes a method to model the PV topology optimization problem using both a synthesis and an optimization approach. The focus is on computationally representing the design problem as well as the problem specific knowledge. Implementations of two different grammar rule sets in the GG are compared to four different encodings of the design problem in the GA. Results are shown for both approaches and a discussion of their advantages and drawbacks is given.

Stichworte: graph grammar; genetic algorithm; computational design synthesis; topology optimization

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