A density-based topology optimization methodology for thermoelectric energy conversion problems is proposed. The approach concerns the optimization of thermoelectric generators (TEGs) and thermoelectric coolers (TECs). The framework supports convective heat transfer boundary conditions, temperature dependent material parameters and relevant objective functions. Comprehensive implementation details of the methodology are provided, and seven different design problems are solved and discussed to demonstrate that the approach is well-suited for optimizing TEGs and TECs. The study reveals new insight in TE energy conversion, and the study provides guidance for future research, which pursuits the development of high performing and industrially profitable TEGs and TECs.

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