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Theoretical model and finite element simulation on the effective thermal conductivity of particulate composite materials

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Abstract

In this study, a new theoretical model considering interfacial thermal resistance, pores and the shape of particles comprehensively was proposed based on the integral average method together with parallel and series model to quantitatively understand the effective thermal conductivity of particulate composite materials. The finite element simulation was utilized to demonstrate our theoretical model for that the experimental data reported in the literature were not rich enough to verify it. It is shown that the larger particles imply the smaller interfacial thermal resistance and the higher effective thermal conductivity. The