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**Prediction of thermo-poro-elastic properties of porous composites  
using an expanded unmixing-mixing model**

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**Abstract**

This study proposes an expanded unmixing–mixing model to predict the material properties of porous composites. The poroelastic strain component that results from gas pressure within the pores was added in a thermo-elastic constitutive equation. The proposed model incorporates micro-state correction factors that represent micro-array effects from kinematic compatibilities in the boundaries of fibers and matrix. Finite element models were used to calculate the material properties of the porous matrix and composites. The results indicate that the material properties predicted by the proposed model are well correlated with those obtained from the finite element models. The results suggest that the proposed model adequately captures the change in the micro-state of porous composites due to pore generation. The model also illustrates the validity of the proposed model for composite thermo-poro-elasticity.

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