

# Multiscale modeling of alloy solidification<sup>1</sup>

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A multiscale framework based on a database approach is presented to investigate alloy solidification. A computationally efficient model, which is different from both the micro-scale model and macro-scale model, is utilized to find relevant sample problems. Similarities between the sample problems and the interested problems are explored by assuming that the liquid volume fraction and microstructure features are functions of solution features extracted from the solution of the computationally efficient model. The efficiency of the proposed multi-scale framework is demonstrated with numerical examples that consider a large number of solidifying crystals. A computationally intensive fully-resolved microscale analysis is also performed to evaluate the accuracy of the multiscale framework.

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