Phase-field approach to heterogeneous nucleation

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Abstract-

We consider the problem of heterogeneous nucleation and growth. The system is described by a phase-field model in which the temperature is included through thermal noise. We show that this phase-field approach is suitable to describe homogeneous as well as heterogeneous nucleation starting from several general hypotheses. Thus we can investigate the influence of grain boundaries, localized impurities or any general kind of imperfections in a systematic way. We also put forward the applicability of our model to study other physical situations such as island formation, amorphous crystallization, or recrystallization.

Index Terms- arbitrary viscosity contrast, mehl-avrami kinetics, hele-shaw flows, crystal-growth, model, crystallization, recrystallization, dynamics, systems, fil

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