TEUBNER-TEXTE zur Physik · Band 17

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Thermodynamics of Finite Systems and the Kinetics of First-Order Phase Transitions

Phase transitions between different states of matter occur in many equilibrium and nonequilibrium systems. The kinetics of these phase changes are studied mainly in the case of condensation of a single vapour in a supersaturated state by homogeneous nucleation. Based on thermodynamic investigations of heterogeneous systems the stochastic and deterministic theory of nucleation and growth of the new phase is derived. The emphasis lies on finite-size-effects which lead to a depletion of the vapour. The results are mainly explained in terms of clusters (droplet model) and enlarged to the influence of external fields. Numerous computer simulations are presented.

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