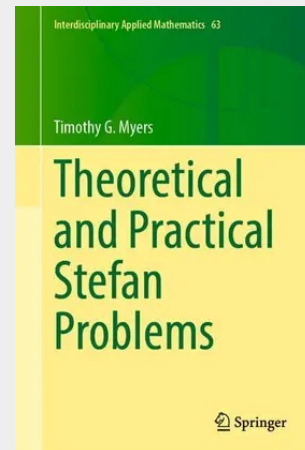


Theoretical and Practical Stefan Problems

This text provides a modern introduction to the mathematical formulation and physical applications of Stefan problems. With a careful balance of theory and practice, it is suitable for both graduate students and experienced researchers in applied math, engineering, physics, and chemistry. The formulation of the Stefan problem and several analytical and approximate solution methods are described in the first three chapters. Applied mathematical techniques needed for later chapters, such as non-dimensionalization, perturbation methods, and lubrication theory, are also covered. The remaining chapters are more specialized and explore formulations going beyond the classical Stefan problem, for example where the material properties and phase change temperatures vary. The theory is always motivated by physical situations and examples: phase change with a flowing liquid in the context of microvalves and ice accretion on aircraft; the solidification of a supercooled liquid, the melting or growth of nanoparticles and nanocrystals and phase change when the heat flow no longer follows Fourier's law.

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