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	Titolo	Interfacial Wave Theory of Pattern Formation in Solidification : Dendrites, Fingers, Cells and Free Boundaries / / by Jian-Jun Xu
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	Soggetti	Amorphous substances Complex fluids Chemical engineering Materials—Surfaces Thin films Statistical physics Fluid mechanics Soft and Granular Matter, Complex Fluids and Microfluidics Industrial Chemistry/Chemical Engineering Surfaces and Interfaces, Thin Films Applications of Nonlinear Dynamics and Chaos Theory Engineering Fluid Dynamics
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	Nota di bibliografia	Includes bibliographical references and index.
	Nota di contenuto	Introduction -- Unidirectional Solidification and the Mullins-sekkerka instability -- Mathematical formulation of free dendrite growth from a pure melt -- Basic steady state of axi-symmetric free dendritic growth -- The steady state for dendritic growth with nonzero surface tension -- Global interfacial wave instability of dendrite growth from a pure melt -- Two dimensional dendritic growth -- Three dimensional dendritic growth from undercooled binary mixture -- Viscous fingering in a hele-shaw cell -- Spatially-periodic deep-cellular growth in hele-shaw cell -- Steady lamellar eutectic growth.
	Sommario/riassunto	This comprehensive work explores interfacial instability and pattern

formation in dynamic systems away from the equilibrium state in solidification and crystal growth. Further, this significantly expanded 2nd edition introduces and reviews the progress made during the last two decades. In particular, it describes the most prominent pattern formation phenomena commonly observed in material processing and crystal growth in the framework of the previously established interfacial wave theory, including free dendritic growth from undercooled melt, cellular growth and eutectic growth in directional solidification, as well as viscous fingering in Hele-Shaw flow. It elucidates the key problems, systematically derives their mathematical solutions by pursuing a unified, asymptotic approach, and finally carefully examines these results by comparing them with the available experimental results. The asymptotic approach described here will be useful for the investigation of pattern formation phenomena occurring in a much broader class of inhomogeneous dynamical systems. In addition, the results on global stability and selection mechanisms of pattern formation will be of particular interest to researchers working on material processing and crystal growth. The stability mechanisms of a curved front and the pattern formation have been fundamental subjects in the areas of condensed-matter physics, materials science, crystal growth, and fluid mechanics for some time now. This book offers a stimulating and insightful introduction for all physicists, engineers and applied mathematicians working in the fields of soft condensed-matter physics, materials science, mechanical and chemical engineering, fluid dynamics, and nonlinear sciences.