2D Calculation of Propagating Thermal Waves surrounding Dendrites

Boyer SAE[1]*, Burr A[1].
*lead presenter: Severine.Boyer@minesparis.psl.eu
1 MINES Paris PSL CEMEF CNRS 7635, Sophia Antipolis, France

A transient thermal modeling is developed [1,2]. The boundary conditions have been simplified into 2D limits without changing the morphologies of the patterns, here dendrites. Dendritic islands were distributed arbitrarily in the liquid fluid. An original numerical scheme based on finite difference was carried out to give a fine description of the temperature distribution at the stage of the initial local disorder (i.e. first stage) and of the global stable organization (i.e. final stage). The waves propagating in the surrounding unstable fluid medium were interpreted by isoline and isocline pictures, referring respectively to the field of temperatures and its gradient. The evolution of the isoline of the temperature as a function of time revealed fractal patterns within the inter-dendritic-liquid, which may lead to sites of extra-germination near the main dendrites.

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References
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