Model Predictive Control Using Thermal Inputs for Crystal Growth Dynamics

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Abstract : Recently, crystal growth technologies have made progress by the requirement for the high quality of crystal materials. To control the crystal growth dynamics actively by external forces is useuful for reducing composition non-uniformity. In this study, a control method based on model predictive control using thermal inputs is proposed for crystal growth dynamics of semiconductor materials. The control system of crystal growth dynamics considered here is governed by the continuity, momentum, energy, and mass transport equations. To establish the control method for such thermal fluid systems, we adopt model predictive control known as a kind of optimal feedback control in which the control performance over a finite future is optimized with a performance index that has a moving initial time and terminal time. The objective of this study is to establish a model predictive control method for crystal growth dynamics of semiconductor materials.
Keywords : model predictive control, optimal control, process control, crystal growth
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