

Choosing Outputs for "good" Riccati Feedback Control of the Stefan Problem

Our goal is the feedback stabilization of a two-dimensional two-phase Stefan problem, which can model solidification and melting of pure materials. The solid and liquid phases are separated by an interface. We want to control and stabilize the interface position.

After linearization and discretization, the stabilization problem results in a non-autonomous differential Riccati equation (DRE). To compute a feedback control, we derive from the solution of the DRE a feedback-gain matrix, which we can apply to the state-deviation in a perturbed Stefan problem.

The performance of the feedback-control strongly depends on the in- and outputs of the system. Especially the choice of the outputs is not straightforward. With different output variants that we tested, the feedback control successfully stabilizes the interface position. However, the time-period until a perturbed interface is stabilized back to the desired position is not satisfactory yet.

Primary author: BARAN, Björn (Max Planck Institute for Dynamics of Complex Technical Systems)

Presenter: BARAN, Björn (Max Planck Institute for Dynamics of Complex Technical Systems)

Track Classification: Talks