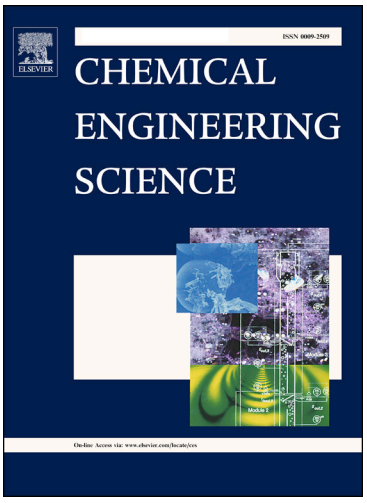

Revisiting APOD accuracy for nonlinear control of transport reaction processes: a spatially discrete approach

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Revisiting APOD accuracy for nonlinear control of transport reaction processes: a spatially discrete approach

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Abstract

This article addresses the problem of output feedback control of dissipative distributed parameter systems. The reduced order model used for controller and observer synthesis is recursively updated using a revised version of adaptive proper orthogonal decomposition (APOD), based on decomposing spatially descrete solution profiles. This approach eliminates the basis size oscillation resulting from the inaccuracy of estimation of energy in APOD when the sampling speed is too slow. The performance of this method is illustrated by applying it to regulate a diffusion-reaction process and a fluid flow system described by the Kuramoto-Sivashinsky equation.

Keywords: adaptive proper orthogonal decomposition, distributed parameter systems, process control, nonlinear control, model order reduction