

Space/time separation based hybrid learning control design for rapid thermal processing system

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Abstract

Temperature distribution estimation and control are critical issues in rapid thermal processing (RTP) system. Except the tracking accuracy, the spatial uniformity and temperature repetitiveness are required during the heating operation. A hybrid learning control is developed based on the space/time separation for handling this difficult problem. The dominant modes of the system are first extracted to construct the reduced model with the help of Galerkin's method, upon which three state estimation methods are then proposed. With the estimated state, the sliding mode control scheme is designed to have the accurate and uniform temperature performance for each operation run. Then, the learning control strategy is designed to work with the sliding mode controller for maintaining the consistency between operation runs.