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EID-estimation-based periodic disturbance rejection for sintering ignition process with input time delay. (English) [Zbl 1398.93078](#)

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Summary: Sintering plays a key role in generating blast furnace burden in metallurgical processes. The continuous production and stable quality of sintering significantly depends on the stable and precise control of sintering ignition, which, however, is achieved through an input time delay system, and suffers from different and unknown disturbances. To reject disturbances and enhance the control precision of ignition temperature, this paper introduces a modified Equivalent Input Disturbance (EID)-based disturbance compensation that is suitable for controlling sintering ignition. First, the periodic properties of disturbances induced by gas pressure fluctuations are obtained based on spectral density decomposition. Second, to obtain the dynamics of sintering ignition, an iterative subspace modeling method is developed, which estimates not only the model parameters but also the length of time delay. By considering the periodic property, a control structure of sintering ignition based on the modified EID-based compensation is proposed, in which an additional time-delay element is designed to make the phase difference between EID estimation and real disturbance close to zero. Finally, the validity of the proposed method is verified by a simulation.

MSC:

93B35 Sensitivity (robustness)

93B30 System identification

90B30 Production models

93C15 Control/observation systems governed by ordinary differential equations

93C83 Control/observation systems involving computers (process control, etc.)

93C73 Perturbations in control/observation systems

Keywords:

equivalent input disturbance (EID); periodic disturbance rejection; sintering ignition; subspace identification; time-delay system

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