

## **Monitoring of a trajectory in industrial grade transition**

汪上曉<sup>1</sup>, 鄭英<sup>2</sup>, Zhao Jing Wang<sup>2</sup>

<sup>1</sup> 國立清華大學, <sup>2</sup> 華中科技大學

### **Abstract**

Many continuous industrial processes will operate in different steady states that produce products with different grades or even different products. The switching between two steady states is called transition. Transition consists of a series of operation changes that should be carried out in proper order, within certain magnitudes and time window. Faulty operation may lead to increase in inferior products, or more importantly, hazard events. Monitoring of the transition process is desired. In this work, a transition identification and monitoring scheme is proposed based on slow feature analysis (SFA). Two monitoring statistics which represent the location of the trajectory and the speed of transition are proposed. Using a numerical example, and the mode 4-to-2 transition of the Tennessee-Eastman process which exhibits catastrophic failure, operating faults were generated based on the guidewords of HAZOP. In addition to missed detection rate and false alarm rate, an early detection performance index was introduced. The advantages of proposed method were benchmarked against a stage-based principle component analysis approach using these indices. transition monitoring, operating faults, transition identification, trajectory-based method

Keyword: transition monitoring, operating faults