Development of the Optimal Control Structure for the MIMO MCFC System Via Linear Matrix Inequality Approach

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The molten carbonate fuel cell (MCFC) system is a MIMO system with interacting process variables. A systematical analysis is essential for building the control structure of the MCFC system.

In this work, the MCFC system is analyzed using the singular value decomposition (SVD) and the relative gain array (RGA) to find the optimal control structure. The SVD is used to split the variables into group pairs and then the RGA is applied to conduct the SISO controller. In the SVD analysis, linear matrix inequality approach is applied to find a scaling-independent condition number. A proper control strategy is applied for each group and the performance is investigated in terms of the load demand changes.