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Inferential Sensor - Based Adaptive Principal Components Analysis of Mould BathLevel for Breakout Defect Detection and Evaluation in Continuous Casting

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Abstract: This paper is concerned with a method for breakout defect detection and evaluation in a continuouscasting process. This method uses Adaptive Principal Component Analysis (APCA) as a predictor of inputs -outputs model, which are defined by the mould bath level and casting speed. The main difficulties that causebreakout in continuous casting are, generally, phenomenon related to the non-linear and unsteady state of themetal solidification process. PCA is a modeling method based on linear projection of the principal components;the adaptive version developed in this work uses the sliding window technique for the estimation of the modelparameters. This recursive form updates the new model parameters; it gives a reliable and accurate prediction.Simulation results compare PCA, APCA, nonlinear system identification using neural network (NN) and supportvector regression (SVR) methods showing that the APCA gives the best Mean Squared Error (MSE). Based onthe MSE, the proposed approach is analyzed, tested and improved to give an accurate breakout detection andevaluation system.

Keywords : Soft sensor, continuous casting, Adaptive principal component analysis, breakout detection and evaluation.