Inferential sensor – Based adaptive principal componentsanalysis for mechanical properties prediction and evaluation

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Abstract: This paper is concerned with a method for on-line quality prediction and evaluation ofmechanical properties in metal testing. This method uses an Adaptive Principal ComponentAnalysis (APCA) as a multi predictor of different sub-models de?ning the mechanical prop-erties such as constraints limits and elongation. The PCA technique, characterized by itsmultivariate component, is strongly recommended to model a multi-input-multi-outputsystem. The complex system is generally known as a non-linear and unsteady state pro-cess. The PCA method is a linear projection. To adapt it and to improve the prediction accu-racy, a variant of this method is considered based on iteratively using a speci?c algorithm.This kind of approaches is applied for constructing an inferential model, which allows areliable and accurate predictor. Simulation results, based on the measured and computeddata using the above-cited method, show that the proposed approach is easily implement-able and give an accurate prediction.

Keywords : Soft sensor, Mechanical testing, Adaptive principal component analysis, Uncertainties evaluation