

# Fault detection and isolation using concatenated wavelet transform variances and discriminant analysis

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A method for fault detection and isolation is developed using the concatenated variances of the continuous wavelet transform (CWT) of plant outputs. These concatenated variances are projected onto the principal component space corresponding to the covariance matrix of the concatenated variances. Fisher and quadratic discriminant analyses are then performed in this space to classify the concatenated sample CWT variances of outputs in a given time window. The sample variance is a variance estimator obtained by taking the displacement average of the squared wavelet transforms of the current outputs. This method provides an alternative to the multimodel approach used for fault detection and identification, especially when system inputs are unmeasured stochastic processes, as is assumed in the case of the mechanical system example. The performance of the method is assessed using matrices having the percentage of correct condition identification in the diagonal and the percentages misclassif