SUPPORT VECTOR REGRESSION MODELS TO THE CALIBRATION OF FAST RESPONSE AERODYNAMIC PROBES

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ABSTRACT

Calibration of pressure probes is crucial for their reliable performance. However, it remains is a very expensive process, in both time and data management terms. Aiming to reduce the cost of the calibration process, surrogate models are used to produce additional data and increase the resolution of the calibration maps, based on a limited number of experiments. As expected the quality of the resulting calibration maps is defined by the prediction error of the model. Kriging-based prediction models are a common choice, due to their effectiveness, increased reliability and popularity. However, the measurements used as inputs to create calibration maps contains a certain noise level which often is not known a priori. This noise on the input training data sets can lower the quality of the predictions if it is not addressed properly. As regards the Kriging models, this issue can be considered by the definition of a nugget factor which forces the model to deviate from the input training data to a certain extent. The efficiency of this correction though heavily relies on the proper selection of the nugget value. In order to overcome this issue, support vector regression models are used as the predictors, alongside to the associated configuration techniques. These techniques enable the definition of the ε-tube, which is crucial to account for noise on the output of the training data. Finally, the size of the training data set is investigated based on the effectiveness of the configuration process and the performance of the final prediction model.