

**Fluid-Structure Coupled Analysis of Vibration Phenomena and Its Classification and
Prediction Using the modular network Self Organizing Map**

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In this research, the authors perform the numerical analysis of the vibration phenomena by the interaction of fluid and structure. Furthermore the analyzed data are classified using Self Organizing Map (SOM) for the purpose to detect the feature of the vibration phenomena and to predict the vibration phenomena by conditions. The SOM is a kind of Neural Network (NN), and it is available for mapping the high order vector data into two-dimensional spaces. The modular network Self Organizing Map (mnSOM) is a kind of SOM, which has special module (e.g. multilayer perceptron) in each unit of the map, and is available for prediction because the mnSOM holds input-output relation. Some fluid rigid body coupled analyses of two-dimensional flow around a spring supported circular cylinder are performed, and mnSOM is used for the classification of the results and for the prediction without performing analysis.

Keywords: Fluid-Structure Coupled Analysis, Vibration Phenomenon, Self Organizing Map, modular network Self Organizing Map