

Optimization of neural networks for time-domain simulation of mooring lines - DTU Orbit (09/11/2017)

Optimization of neural networks for time-domain simulation of mooring lines

When using artificial neural networks in methods for dynamic analysis of slender structures, the computational effort associated with time-domain response simulation may be reduced drastically compared to classic solution strategies. This article demonstrates that the network structure of an artificial neural network, which has been trained to simulate forces in a mooring line of a floating offshore platform, can be optimized and reduced by different optimization procedures. The procedures both detect and prune the least salient network weights successively, and besides trimming the network, they also can be used to rank the importance of the various network inputs. The dynamic response of slender marine structures often depends on several external load components, and by applying the optimization procedures to a trained artificial neural network, it is possible to classify the external force components with respect to importance and subsequently determine which of them may be ignored in the analysis. The performance of the optimization procedures is illustrated by a numerical example, which shows that, in particular, the most simple procedures are able to remove more than half of the network weights in an artificial neural network without significant loss of simulation accuracy.

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