

Identification of Impact Load and Partial System Parameters Using 1D-CNN

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Abstract : The identification of impact load and some hard-to-obtain system parameters is crucial for the activities of analysis, validation, and evaluation in the engineering field. This paper proposes a method that utilizes neural networks based on 1D-CNN to identify the impact load and partial system parameters from measured responses. To this end, forward computations are conducted to provide datasets consisting of the triples (parameter θ , input u , output y). Then neural networks are trained to learn the mapping from input to output, $f_u|\{\theta\} : y \rightarrow u$, as well as from input and output to parameter, $f_\theta : (u, y) \rightarrow \theta$. Afterward, feeding the trained neural networks the measured output response, the input impact load and system parameter can be calculated, respectively. The method is tested on two simulated examples and shows sound accuracy in estimating the impact load (waveform and location) and system parameters.

Keywords : convolutional neural network, impact load identification, system parameter identification, inverse problem

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