Neural-Net Based Identification of Integration-Free Hysteresis Model

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ABSTRACT

Hysteresis is a unique form of behavior observed in numerous scientific and engineering disciplines. In order to describe the hysteretic behavior, the models consist of a nonlinear scalar differential equation with a small number of parameters were used. The advantage of a differential equation is that it localizes the interactions within a system, making many problems simpler. The disadvantage of a differential equation, however, is that it is not be able to explain all of its solutions in terms of basic functions, and it may require a great deal of complex analysis to comprehend them. As the growth of material and building technology necessitates the creation of new types of members and joints, as well as the development of models, it is anticipated that the design of a model in the form of differential equations will be fraught with numerous challenges. Our research intends to provide a methodology for developing a neural network-based hysteresis model applicable to dynamic analysis derived from pseudo-static experiments. To do this, the results of the pseudo-static experiment is used to develop an architecture that produces the output from the input. In the first place, the authors devised a technique to include in the learning set not only the input of pseudo-static trial outcomes, but also the input of wide steps. The result showed that the proposed model is error-free even when employed for dynamic analysis.

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