

Computation of Nonlinear Normal Modes using Numerical Continuation Techniques

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The concept of nonlinear normal modes (NNMs) is discussed in the present paper. One reason of the still limited use of NNMs in structural dynamics is that their computation is often regarded as impractical. However, when resorting to numerical algorithms, we show that the NNM computation is possible with limited implementation effort, which paves the way to a practical method for determining the NNMs of nonlinear mechanical systems. The proposed algorithm relies on two main techniques, namely a shooting procedure and a method for the continuation of NNM motions. The algorithm is demonstrated using two different mechanical systems, a nonlinear two-degree-of-freedom system and a simplified discrete model of a nonlinear bladed disk.