Modelling the damping at the junction between two sub-structures by non-linear models : improving the model and the resolution

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Abstract

We are interested in the modelling of the damping at the level of the junction between two substructures. In previous works [1],[2], we have represented the connection by a simplified model, which takes into account both dissipative and non-linear aspects of the junction. We used Bouc-Wen and Dahl models, which were adapted to be inserted in a finite elementsystem.
In the present work, we use the generalized Iwan-Jenkins model (combination of springs and dry friction elements). This model makes it possible to better simulate non-linear damping behaviours observed in experiments. Moreover, the differential system obtained with the Iwan-Jenkins model, can be solved using the notion of sub-differential, which is a powerful mathematic tool to solve non-smooth differential systems [3], [4].

The initial tool presented in [3] is adapted to solve differential systems with several degrees of freedom. Numerical simulations including the Iwan-Jenkins model are presented. A comparative study between different algorithms (Runge-Kutta, differential inclusions) is shown. A comparison between numerical simulations and experimental results is also presented.

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