MODELLING THE DAMPING AT THE JUNCTION BETWEEN TWO SUBSTRUCTURES BY NON-LINEAR MODELS : IMPROVING THE MODEL AND SPEEDING THE RESOLUTION

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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 element system.

In the present work, we use the generalized Iwan-Jenkins model (combination of springs and dry friction elements, see figure 1 below). 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.

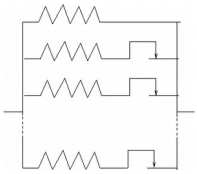

Figure 1 : Generalized Jenkins model

[1] V. Kehr-Candille, *Modelling the Damping et the Junction between Two Substructures*, Journal of Aerospace Lab, Issue 14 (September 2018)

[2] V. Kehr-Candille, *Identification of hysteretic systems for damping modelling*, proceedings of ISMA 2018 International Conference on Noise and Vibration Engineering, september 2018, Leuven (Belgium)

[3] C.L. Lamarque, J. Bastien, F. Bernardin, *Non-smooth Deterministic or Stochastic Discrete Dynamical Systems*, ed. Wiley (2013)

[4] J. Bastien, G. Michon, L. Manin, R. Dufour, *An analysis of the modified Dahl and Masing models : Application to a belt tensioner*, Journal of Sound and Vibration **302**(2007) 841-864