

## Nonlinear Dynamic Stability of Multi-Suspended Roof Systems

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The present work deals with the nonlinear dynamic stability aspects of initially imperfect dissipative multi-suspended roof systems under step loading. A fully nonlinear analysis is used to establish that global stability, being the main feature of multi-suspension roof systems, is captured by the proposed autonomous conservative models. For realistic geometrical combinations, stiffness and damping parameters involved, the plots presented in the paper show that all model cases, dealt with the global dynamic response, are stable. This is the primary advantage of multi-suspension roofs, captured by the proposed simulation. Moreover, the vertical vibrations evaluated were of small amplitude, the snap-through phenomenon totally absent and the effect of complementary fixed points were minimal, contrary to recently reported results concerning simple models of single-suspended roofs found in other papers. The results agree well with the ones concerning doubly-suspension roofs reported in a previous paper by the same authors as here. Thus, the proposed autonomous multi-DOF model can serve as an efficient tool for the understanding of the main features of multiple suspension roofs and offers a first insight into the well established advantages of this popular roofing system.

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