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UNCERTAINTY QUANTIFICATION IN THE DYNAMICS OF COMPOSITE BOX-BEAMS CONTAINING ARRAYS OF LOCAL RESONATORS

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Abstract. In this article we evaluate the influence of elastic and material configurations of composite box beams together with the incorporation of internal resonators periodically distributed in the construction of meta-structures applied for vibration suppression. The uncertainty of constructive parameters is involved in order to identify the features of the attenuation bands of frequency present in this class of meta-structures. To perform this study, we resorted to the Parametric Probabilistic Approach employing a previously developed deterministic thin walled beam model with internal resonators periodically distributed (modeled as spring-mass subsystems), which in turn serves as a mean model for constructing the probabilistic model. This implies that the uncertain parameters in the model are considered random variables. The probability density functions of the adopted random variables are deduced by means of the Maximum Entropy Principle accepting some known values (and assuming others) of basic composite materials, i.e. resins and fibers, as well as the parameters of the resonator subsystem. Deterministic and probabilistic approaches are sustained in the computational representation of the finite element method. The Monte Carlo Method is employed to perform the simulation assuming that all random variables are not correlated.