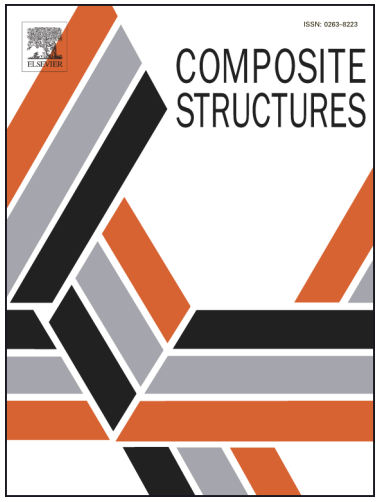

Active-passive damping in functionally graded sandwich plate/shell structures

José S. Moita, Aurélio L. Araújo, Victor Franco Correia, Cristóvão M. Mota Soares, José Herskovits

PII: S0263-8223(17)34031-X
DOI: https://doi.org/10.1016/j.compstruct.2018.01.089
Reference: COST 9329

To appear in: *Composite Structures*

Received Date: 30 November 2017
Revised Date: 10 January 2018
Accepted Date: 30 January 2018

Please cite this article as: Moita, J.S., Araújo, A.L., Franco Correia, V., Mota Soares, C.M., Herskovits, J., Active-passive damping in functionally graded sandwich plate/shell structures, *Composite Structures* (2018), doi: https://doi.org/10.1016/j.compstruct.2018.01.089

ACTIVE-PASSIVE DAMPING IN FUNCTIONALLY GRADED SANDWICH PLATE/SHELL STRUCTURES

José S. Moita [a], Aurélio L. Araújo [a], Victor Franco Correia [b, 1], Cristóvão M. Mota Soares [a], José Herskovits [c,d]

[a] IDMEC, Instituto Superior Técnico, Universidade de Lisboa
Av. Rovisco Pais, 1049-001 Lisboa, Portugal

[b] Escola Superior Náutica Infante D. Henrique,
Av. Eng. Bonneville Franco, 2770-058, Paço de Arcos, Portugal

[c] COPPE-UFRJ, Universidade Federal do Rio de Janeiro, Brazil
[d] Department of Mechanical and Materials Engineering
Military Institute of Engineering, Rio de Janeiro, Brazil

Abstract. In this work, a simple and efficient finite element model is applied to the vibration analysis of active-passive damped multilayer sandwich plates/shells with a viscoelastic core, sandwiched between functionally graded material (FGM) layers, and including piezoelectric layers. Both the FGM and the piezoelectric layers are modelled using the classical plate theory and the core is modelled using Reddy's third-order shear deformation theory. The sandwich finite element is obtained performing the assembling of N "elements" through the thickness, by using specific assumptions on the displacement continuity at the interfaces between layers. To achieve a mechanism for the active control of the structural dynamics response, a feedback control algorithm is used, coupling the sensor and active piezoelectric layers. The dynamic analysis of the sandwich plate/shell structures is conducted in the frequency domain to obtain the natural frequencies and the loss factors of the viscoelastic core and in time domain for the steady state harmonic motion. For both analyses, a finite element code has been implemented. The model is applied in the solution of some illustrative examples and the results are presented and discussed.

Keywords: Piezoelectric actuators; Viscoelastic material; Active-passive damping; FGM; Sandwich.

[1] Corresponding author: victorfranco@enautica.pt