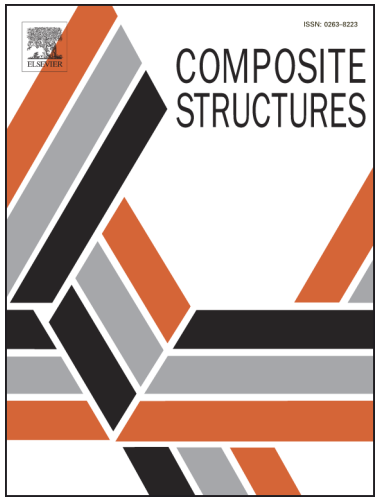

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VIBRATION ANALYSIS OF VARIABLE THICKNESS PLATES AND SHELLS BY THE GENERALIZED DIFFERENTIAL QUADRATURE METHOD

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ABSTRACT. The main purpose of this work is to perform the free vibration analysis of several laminated composite doubly-curved shells, singly-curved shells and plates, characterized by a continuous thickness variation. Variable thickness could affect the design of shell structures since it allows to tailor the stiffness features in the most stressed areas within the domain, keeping the weight constant. As a consequence, an improved dynamic behavior may be exhibited. The governing equations are solved numerically by the Generalized Differential Quadrature (GDQ) method, which has proven to be an accurate, stable and reliable numerical tool. Its accuracy is tested by means of several comparisons with analytical and semi-analytical results available in the literature, and with the solutions obtained by a three-dimensional Finite Element (FE) model. The theoretical approach considered in the current paper is general and allows consideration of many higher-order structural theories in a unified manner, in which the order of the kinematic expansion can be chosen arbitrarily.

KEYWORDS: Variable thickness, Doubly-curved shells, Laminated composite structures, Natural frequencies, Generalized Differential Quadrature method.

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