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Analysis of functionally graded beams under transverse loading

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Functionally graded materials (FGMs) have received considerable attention in many engineering applications since they were first reported in 1980s. FGMs are composite materials, microscopically inhomogeneous, in which the mechanical properties vary smoothly and continuously from one surface to the other. Compared with classical laminated composite materials, FGMs provide superior thermo-mechanical performances under given loading circumstances. FGMs can be used to improve creep behavior, fracture toughness of machine tools, wear resistance, oxidation resistance of high temperature aerospace and automotive components and so on. It is the intention of the present study to examine the effect of geometric nonlinearity on displacements and stresses in beams made of functionally graded materials (FGMs) subjected to thermo-mechanical loadings by using the ANSYS. The results obtained from this method are compared with the displacements and stresses of the beam are obtained based on a first-order shear deformation beam theory (FSDBT).

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Study of the melting latent heat of semi crystalline PVDF applied to high gamma dose dosimetry

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Poly(vinylidene fluoride) homopolymers [PVDF] homopolymers were irradiated with gamma doses ranging from 0.5 to 2.75 MGy. Differential scanning calorimetry (DSC) and FTIR spectrometry were used in order to study the effects of gamma radiation in the amorphous and crystalline polymer structures. The FTIR data revealed absorption bands at 1730 and 1853 cm^{-1} which were attributed to the stretch of C=O bonds, at 1715 and 1754 cm^{-1} which were attributed to the C=C stretching and at 3518, 3585 and 3673 cm^{-1} which were associated with NH stretch of NH_2 and OH. The melting latent heat (LM) measured by DSC was used to construct an unambiguous relationship with the delivered dose. Regression analyses revealed that the best mathematical function that fits the experimental calibration curve is a 4-degree polynomial function, with an adjusted R-square of 0.99817.

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