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Bennouna, M.M.K. Nonlinear dynamic behaviour of a clamped-clamped beam, with consideration of fatigue life.

The nonlinear vibration of a clamped-clamped beam at large vibration amplitudes is examined in this work. Complementary theoretical and experimental studies have been carried out which show that the fundamental mode shape and its derivatives are amplitude-dependent, spatially-dependent harmonic distortion of the transverse displacement occurs at large amplitudes and harmonic distortion of total strain is mainly due to the axial strain component.

The statistical approach to the analysis of nonlinear vibration induced by random loading is examined theoretically and experimentally, good correlation being achieved between predicted and measured fatigue lives. Consideration is also given to application of the techniques developed to the study of composite structures.