

On Two Hypotheses About the Gao Beam

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Abstract: The nonlinear beam model introduced by Professor Gao in 1996 has become widely known as the Gao beam. In connection with this model, two key hypotheses concerning its mechanical behavior were formulated. The first states that the critical buckling load for the Gao beam is identical to that of the classical Euler–Bernoulli beam. The second claims that the Gao beam is generally stiffer than its Euler–Bernoulli counterpart. In this talk, we present a mathematical proof confirming the first hypothesis. However, the second hypothesis does not hold in general; this conclusion is supported by numerical simulations and data analysis. The results indicate that while the Gao beam exhibits comparable stability under buckling, its stiffness properties can vary depending on loading and boundary conditions.