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Nonlinear bending response of functionally graded nanobeams with material uncertainties

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Highlights

- Material uncertainties are quantified as interval parameters instead of random parameters, which is appropriate to address the uncertainties with limited measured data.
- A non-probabilistic uncertainty modeling for the FG nanobeam is developed, which not only takes the uncertainties into account, but also can be degenerated into the deterministic model.
- An iterative algorithm based interval analysis method with high accuracy is proposed for the uncertainty propagation analysis of nonlinear bending response of the FG nanobeam
- Combined effects of material uncertainties and size-dependent parameters as well as the power-law index of the FG material on the nonlinear bending response of the FG nanobeam are studied in detail.
- Conclusions provide helpful guidance for the reliability design of nanodevices.

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