Analyzing the Gao beam using data analysis

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Abstract: This contribution deals with the original static model of the Gao beam from 1996, see [1]. Although the nonlinearity contained in the basic equation is of a rather mild type, the properties resulting from it are not easily obtained by standard analytical procedures, which the authors of this contribution can unfortunately confirm. Therefore, it is appropriate to turn to less standard procedures, especially data analysis. We obtain large amounts of data using a large series of calculations and the analysis of these results is then performed partly using simple algorithms, i.e., say, using primitive AI (Artificial Intelligence), partly and finally using a much smarter and more sophisticated HI (Human Intelligence). In this way, it is possible to obtain, understandably at the cost of a considerable amount of work, quite interesting properties that would otherwise have remained undiscovered. The results presented here concern both convex and non-convex problems associated with the original Gao beam.

References

 Gao, D.Y.: Nonlinear elastic beam theory with application in contact problems and variational approaches. Mechanics Research Communications, Vol. 23, No. 1, pp. 11-17, 1996.