

On Application of Theory of Distributions to Static and Dynamic Analysis of Cracked Beams

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Abstract:

This paper presents a rigorous study on the static and dynamic behavior of beams affected by cracks. The theory of distributions developed by Laurent Schwartz is adopted as it is particularly suitable for the treatment of discontinuities in functions for the deflection and derivatives of the beam. Thus, this paper presents a contribution towards the understanding and application of the theory of distributions to the static and dynamic behavior of structural elements affected by cracks. A simple, computationally efficient and accurate algorithm is developed for the problems of concern. Numerical results are presented for beams with two cracks. The algorithms developed for beams with discontinuities are obtained in a rigorous framework for static and vibration problems.

Keywords: Cracked beam, distribution theory, generalized function, discontinuity