Finite element analysis for a functionally graded rotating shaft with multiple breathing cracks

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Highlights

- Finite element formulation for dynamic characteristics of FG shafts with multiple breathing cracks is developed.
- Whirl frequencies and critical speeds of a rotor-bearing system with multiple cracked FG shaft depend on power law gradient.
- In an FG shaft, power law gradient could be decided to minimize the undesirable effects in the event of multiple breathing cracks appearing during service.