

Accepted Manuscript

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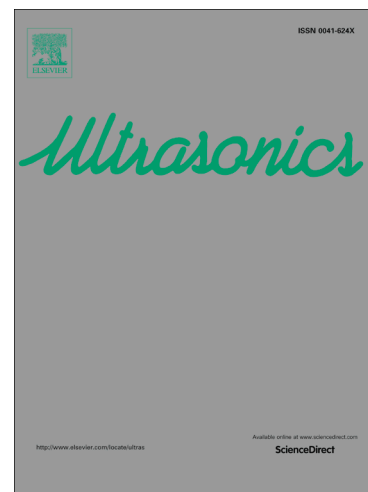
PII: S0041-624X(17)30291-3
DOI: <https://doi.org/10.1016/j.ultras.2017.11.005>
Reference: ULTRAS 5651

To appear in: *Ultrasonics*

Received Date: 30 March 2017
Revised Date: 31 October 2017
Accepted Date: 4 November 2017

Please cite this article as: X. Shen, D. Ren, X. Cao, J. Wang, Cut-off frequencies of circumferential horizontal shear waves in various functionally graded cylinder shells, *Ultrasonics* (2017), doi: <https://doi.org/10.1016/j.ultras.2017.11.005>

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Cut-off frequencies of circumferential horizontal shear waves in various functionally graded cylinder shells

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Abstract

In this study, cut-off frequencies of the circumferential SH waves in functionally graded piezoelectric-piezomagnetic material (FGPPM) cylinder shells with traction free, electrical and magnetic open boundary conditions are investigated analytically. The Wentzel-Kramers-Brillouin (WKB) method is employed for solving differential equations with variable coefficients for general cases. For comparison, Bessel functions and Kummer functions are used for solving cut-off frequency problems in homogenous and ideal FGPPM cylinder shells. It is shown that the WKB solution for the cut-off frequencies has good precise. The set of cut-off frequencies is a series of approximate arithmetic progressions, for which the difference is a function of the density and the effective elastic parameter. The relationship between the difference and the gradient coefficient is described. These results provide theoretical guidance for the non-destructive evaluation of curved shells based on the cut-off frequencies.

Keywords: functionally graded piezoelectric-piezomagnetic material; cylinder shear; SH wave; cut-off frequency; Wentzel-Kramers-Brillouin method

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