

عنوان مقاله:

Ultrasonic guided waves reflection from simple dent in pipe for defect rate estimation and parameters determination of axisymmetric wave generation source

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خلاصه مقاله:

In this paper, the reflection of ultrasonic guided waves from simple dent in pipes has been investigated using finite element method and the relationship between reflection coefficient of these waves and deformation rate has been determined. Also, the effect of the parameters of wave generation source on the generated wave field has been investigated using normal modes expansion method. At first, ultrasonic guided waves propagation has been studied in an intact pipe to obtain multiple modes using of displacement potential method. The characteristic equation has been solved using a matlab code in order to draw the dispersion curves of phase and group velocities in different frequencies for longitudinal modes, and it is observed that mode $L(0,2)$ is a suitable mode for inspection in a range of frequency 200-300 kHz. The single sided dent is created in pipe using a plasticity analysis with the aid of finite element simulation and then $L(0,2)$ mode is generated in pipe. By Investigation of the reflection of this mode from dent, the relationship between reflection coefficient and deformation rate is specified and it has been observed that this relationship is almost linear by curve fitting. Also, it has been observed in case of partial loading by wave generation source that is a transducer with a specified axial length and circumferential coverage angle, a combination of different modes such as $L(0,2)$ mode is generated in pipe, if using a axisymmetric wave generation source including 8 segments 45 degree, only $L(0,2)$ symmetric mode is generated

کلمات کلیدی:

Ultrasonic Guided Waves, Dent, Deformation Rate, Wave Reflection Coefficient, Source parameters

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