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Identification of Corrosion Damage in Submerged Structures Using Anti-symmetric Lamb Wave Mode

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Early detection of corrosion in metallic structures is a key to prevent their further deterioration and failure. A damage identification approach capitalising on the fundamental anti-symmetric mode of Lamb waves (A₂) was developed, to facilitate awareness of corrosion. When applied to submerged structures, however, Lamb waves are observed sensitive to the existence of surrounding fluid, leading to erroneous identification without appropriate rectification. Numerical simulation and experiment were carried out to calibrate quantitatively changes in wave propagation due to fluid coupling. Based on this, rectification was applied. The approach was validated by detecting chemical corrosion in a submerged aluminium plate, with the assistance of a probability-based diagnostic imaging technique. Results revealed the vital necessity of compensating for medium coupling when applying Lamb-wave-based damage identification to structures with coupled media.

Ключевые слова:

Содержание.

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