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Surface wave generation by piezoelectric transducer on perspex wedges and their interaction with notches in steel

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A compressional piezoelectric transducer of frequency 4 MHz mounted on machined perspex wedges, placed on carbon steel was studied. At a defined incident angle, compression waves are mode converted to shear waves at the interface between perspex and carbon steel. Increasing the incident angles, that is, using larger angle perspex wedges, two refraction critical angles are observed according to Snell's law, first corresponding to compression waves and second to shear waves. Our results - both experimental and Matlab calculations - show that for perspex wedges with geometric angles of 70 degree; surface waves are produced in carbon steel. A plot of the acoustic wave maximum value reflection intensities against the angles of incidence confirms established behaviour. the propagation and interaction of surface waves in a 3-notch 4340 steel calibration block is further analysed. This simple instrumentation configuration is shown to be effective in the characterisation of surface breaking flaws in steel.

Primary author: Dr SIKAKANA, Ike Q (Department of NDT and Physics, Vaal University of Technology)

Co-author: Mr MASHA, Tukisho A (Department of NDT and Physics, Vaal University of Technology)

Presenter: Dr SIKAKANA, Ike Q (Department of NDT and Physics, Vaal University of Technology)

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