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Lamb waves filtering by waveguides with linear varying section

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This experimental and numerical work deals with the study of Lamb modes propagating in a plate with a linear variation of thickness. The varying section area exhibits a filtering phenomenon for Lamb modes having a frequency-thickness cut-off. If the incident Lamb wave, excited at a given frequency and propagating downslope, reaches its thickness cut-off in the varying section area, it is reflected and propagates upslope. Otherwise, it is transmitted outside the varying section domain with modes conversion. The S2 incident mode is a particular case : when it reaches its cut-off, it is converted into the S1 mode with negative groupe velocity and a downslope propagation; then the S1 Lamb wave is reflected at its cut-off. The experimental and numerical studies are in good agreements.