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Trapped Wave in Plan Waveguides Including Gaussian Varying Section Domain

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In previous works on plan waveguides including an area of varying section of Gaussian shape, we have observed experimentally and numerically the existence of a trapped wave in the Gaussian varying section domain in the case of the A1 incident Lamb mode. The purpose of this work is to highlight the existence of this trapped wave, depending on the equation of the Gaussian profile of the varying section domain. This study is carried out numerically using FEM, as our numerical model has been previously validated. The results obtained show that the phenomenon of trapped wave is strongly linked to the Lamb wave conversion phenomenon: when the incident Lamb wave gives rise to a trapped wave, it is systematically converted into other Lamb waves transmitted outside the area of varying section. Otherwise, it is totally transmitted without any conversion and in this case, any trapped wave exists. The conversion phenomenon is quantified and we show that it is important and depend on the breaking symmetry of the incident Lamb mode by the varying section area.