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ANALYSIS OF LASER-GENERATED GUIDED WAVES IN PLATE STRUCTURES

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Recently laser-generated Lamb waves have drawn attention in the nondestructive testing (NDT) field. The excitation can be achieved without imposing any contact on the material surface, which exempts the bonding process during the testing. Propagation of Lamb waves is notably affected by the damage in the plate, and the damage detection is relatively convenient due to the wide distribution of the frequency components. However, the recent trend in the laser-generated guided waves is focused on the experiments. Consequently, theoretical and numerical studies are not sufficiently carried out compared to the experimental studies. In this paper, theoretical and numerical analyses of the laser-generated guided waves in plate structures are performed. A numerical simulation technique to simulate the heat excitation by the laser shot and the consequent wave generation is explained from the multiphsyical point of view. The numerical results are investigated and verified, compared with the analytical solutions and the experimental results. The comprehensive investigation shows that the proposed numerical technique enables us to obtain accurate simulation results for the laser excited Lamb wave propagation.

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