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Laser ultrasonic study of Lamb wave propagation in different film loading configurations

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A study is performed concerning the propagation Lamb waves in technologically and scientifically interesting configurations. In a first configuration a thin film was loaded with different liquids on its two sides. Three experimental laser ultrasonic configurations, line excitation with scanning detection, grating excitation with single point detection, and grating excitation with scanning probe beam, were implemented. All experimental results were found to be consistent between experimental methods and with theoretical predictions. The configuration can be implemented in monitoring applications where elastic properties of liquids that are kept in containers can be determined via the outside container wall. In a second configuration laser excited and detected Lamb waves in a rubber-metal bi-layer were used to determine the highly damped elastic properties of rubber.