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Theoretical study of the diffraction fields generated by a fluid-loaded plate with two-surface corrugation

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A renewed interest has recently emerged in the study of the interaction of elastic waves with periodic structures, including periodically corrugated surfaces. From prior theoretical and experimental studies of the diffracted fields generated by such surfaces, it is well known that periodically corrugated surfaces can be used to generate ultrasonic surface waves, which are especially important in the field of ultrasonic non-destructive evaluation. In general, anomalies appear in the reflection and transmission spectra due to the presence of the corrugation, and these anomalies can be correlated with the surface waves generated. The present work has extended the theory of diffraction on periodically corrugated surfaces to the case of a fluid-loaded plate with both sides corrugated. The unique filtering effects and diffraction phenomena that can be achieved with such a structure are examined and related to the creation of surface and plate waves.