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**The application of thin plate theory to the time evolution of  
musical instruments**

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The steady state dynamics of many musical instruments can be modeled using thin-plate theory. It has been shown that the normal-mode frequencies of systems as diverse as the orchestral crotale and piano soundboard can be accurately calculated within this approximation, and it is therefore reasonable to ask if thin-plate theory can be applied to model the time evolution of these instruments. To answer this question we have modeled a struck flat plate using finite differences and compared the decay of the eigenmodes to experimental results. We find that the time evolution of the motion of a struck thin plate is not well described under the thin-plate approximation even when the modal frequencies are predicted accurately. We propose that mode coupling between longitudinal and transverse modes requires that a full three dimensional model be used to predict the time evolution even when the plate is thin.