

Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Acoustic Properties of a Vibrating Plate in the Uniform Flow

DACHUAN LU, Nanjing Univ — The characteristics of the sound produced by a vibrating plate is subtle and it is commonly occurred in the daily life. In this study, acoustic properties of the pure tone produced by a vibrating plate with in-plane tension in the uniform parallel flow is theoretically investigated by modifying Euler-Bernoulli beam equation combined with the mean flow theory. Explicit expression for the frequency of the pure tone is derived by eigenvalue method, in that all of the parameters can be measured in experiment. We find a new relation between the square of the frequency and the tension and the flow velocity, as $f^2 \propto U^2 + aT + b$, where a and b are constant. On the basis of our formula, the sound frequency can be precisely described. Meanwhile, the effects of the flow velocity and in-plane tension on the frequency and intensity of the sound have been investigated experimentally, our experiments have a good agreement with the theoretical results.

Dachuan Lu
Nanjing Univ

Date submitted: 06 Oct 2016

Electronic form version 1.4