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Near-Field Acoustic Holography of Chladni Plate HYUNHEE KIM, YUNBOG KIM, DONGRYUL JEON, Seoul National University, Department of Physics Education, Seoul 151-748, Korea — Characteristic modes of a Chladni plate can be visualized by sand gathering along the nodal lines. Although one can view two-dimensional vibration patterns, the sand pattern does not show a bending of antinode. We used near-field acoustic holography to reconstruct a three-dimensional image of circular and rectangular Chladni plates. The sound pressure was measured using four scanning microphones located 3 mm above a Chladni plate. A reference microphone was placed close to a speaker which drives the plate. A total of 60x60 data were collected from 30x30 cm^2 area and processed using MATLAB in accordance with the algorithm of near-field acoustic holography. The three-dimensional graphic image of the vibrating plate reconstructed this way not only matched the sand pattern but also visualized the bending of the plate. Propagation of the sound pressure could be also visualized three-dimensionally. The plot of sound pressure against the distance showed the $1/\text{distance}^2$ dependence as expected. Sound is a difficult subject in physics class because it is invisible. Our results demonstrate that near-field acoustic holography combined with computer graphic is an effective tool to visualize the generation of a sound.

Hyunhee Kim
Seoul National University, Department of Physics Education,
Seoul 151-748, Korea

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