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Weak radiator design using dimples

D. Chih-Chun Cheng^a, Wen-Nan Cheng^a and Cary H. Koopmann^b

^aNational Chung Cheng University, Dept. of Mechanical Engineering, 160, San-Hsing, Ming-Hsiung, 621 Chia-Yi, Taiwan

^bPennsylvania State University, Dept. of Mechanical and Nuclear Engineering, 157 Hammond Building, University Park, PA 16802, USA

A design method for achieving minimum radiation of sound from a beam by creating cylindrical dimples on its surface is presented. Two strategies of determining the dimple size and its location on the beam are presented. The first is based on the optimization method, in which the dimple size and its location are the design variables. The design variables that minimize the sound power are obtained directly using an optimization subroutine. The second is to synthesize the beam's weak radiator mode using a set of dimples, in which the mode shape of the dimpled beam is a close fit to the beam's weak radiator mode. As a comparison in sound power reduction between these strategies, numerical results for a simply supported beam in a rigid baffle excited by a harmonic force are presented.