

## Active control of inner field and radiation of a ducted noise source

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A ducted noise source such as a fan with a duct can either be controlled by sound absorptive material or by a active noise control system that has some advantage to control a rather low frequency of noise. To investigate what is happening inside of a duct when a certain active noise control strategy is applied, an analytic solution has been obtained based on a Green's function for a duct that has two sources and frequency-dependent termination [Y.-H. Kim and S.-W. Kang, J. Acoust. Soc. Am. **94**, 473–490 (1993)]. A number of cost functions are studied for active control of the inner and outer field of the duct. The cost functions investigated include the total acoustic potential energy, total acoustic power output, acoustic absorbing power of the control source, active intensity; that is, power flow, propagating and reflected acoustic potential energy, and pressure at a fixed point. The control effects by minimization of each cost function are investigated for various termination conditions that mean the loading condition of the exterior acoustic field. The location of a control source is also considered to see the effect upon the acoustic characteristics inside and outside of the duct. The numerical results that visualize the sound energy and intensity distribution are demonstrated.

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