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## On coupled wave scattering of structures involving flexible boundaries

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The study of non-uniform obstacles in an otherwise uniform waveguide has received wide attention in the literature. The transmission of elastic and electromagnetic waves, underwater sound propagation, and sound scattering in ducts or pipes are the major application areas in waveguide theory. Particularly the curiosity is to reduce the ducted fan noise emanated from aero engines, power stations and heating, ventilation, and air conditioning (HVAC) systems. There are several mathematical models existing for computing sound attenuation by such dissipative devices which are often used to attenuate broadband noise arising from fluid moving devices like fans and internal combustion engines. In this study, we aim to investigate theoretically the mode-matching analysis of a two dimensional waveguide problem subject to rigid and flexible walls. The governing mathematical model characterizes the system to be non Sturm-Liouville. Therefore the development of generalized orthogonality relations corresponding to acoustic transmission through the duct regions is the major necessity to find out solution. Also appropriate edge conditions including, clamped and pin-jointed are considered in order to guarantee the uniqueness of solution. We investigate amplitudes of reflection and transmission coefficients along with power distribution for each duct region. The aims of this study were to assess distribution of power through the fluid regions and the flexible wall using different edge conditions. In order to see the accuracy of results the truncated system is verified through the matching interface conditions and the power balance as well. In this way, the mode-matching technique proves to be surprisingly accurate and is a useful tool for solving acoustic structural problems.

### Biography

Rab Nawaz has completed his PhD from Department of Mathematics, Quaid-i-Azam University Islamabad. He is an Assistant Professor of Mathematics at COMSATS Institute of Information Technology, Islamabad. He has published more than 25 papers in reputed journals and has been serving as a reviewer of many well-reputed journals.

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