

# Title: Numerical Simulation of Rotor/Stator Interaction Tonal Noise

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A hybrid method is used to simulate the forward propagating noise generated by rotor-staotor interaction at discrete frequencies. A frequency based Non-Linear Harmonic (NLH) method is used to predict pressure perturbations on surface of stator vanes, and propagation of these noise signatures in near field. In order to avoid dissipation of sound waves a Finite Eelement Method (FEM) with Pierce Howe two equation wave operator is used to propagate noise signatures inside of a 3.48m duct from near field to far field. A Boundary Element Method (BEM) with convetive Helmholtz equation and Green's function solution is used to simulate far field sound radiations. The capability of this approach is verified by applying on low mach number Laboratory fan rig with 19 rotor blades and 18 stators. The present method provides a gain of close to two orders of magnitude as compared to standard unsteady CFD simulation methods, by requiring only one passage to be meshed and simulating sound generation and propagation in near field simultaneously. Results are compared with experimental data and good agreement is achieved at low frequencies with a difference of 2dB and relatively acceeptable at third Harmonic with a difference of upto 10 dB.

**Biography**

Author (Tayyab Tahir) has completed his Bachelor degree from Institute of avionics and astronauts (IAA) of Air University, Islamabad, Pakistan in 2016 and got Reseach Scholarship from Beijing University of Aeronautics and Astronauts for doing Master degree in Fluid Machinery Engineering. His research field is Aeroacoustics and doing research in Laboratory of Fluid and Acoustic Engineering, under supervision of Professor Li. Xiaodong. Professor Li is among well know Researchers of China and had been involved in several industrial based projects.

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