

Investigation of Flow Effects of Soundwaves Incident on an Airfoil

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Abstract : The field of aerodynamics and aeroacoustics remains one of the most poignant and well-researched fields of today. The current paper aims to investigate the predominant problem concerning the effects of noise of varying frequencies and waveforms on airflow surrounding an airfoil. Using a single speaker beneath the airfoil at different positions, we wish to simulate the effects of sound directly impinging on an airfoil and study its direct effects on airflow. We wish to study the same using smoke visualization methods with incense as our smoke-generating material in a variable-speed subsonic wind tunnel. Using frequencies and wavelengths similar to those of common engine noise, we wish to simulate real-world conditions of engine noise interfering with airflow and document the arising trends. These results will allow us to look into the real-world effects of noise on airflow and how to minimize them and expand on the possible relation between waveforms and noise. The parameters used in the study include frequency, Reynolds number, waveforms, angle of attack, and the effects on airflow when varying these parameters.

Keywords : engine noise, aeroacoustics, acoustic excitation, low speed

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