

Semi-Empirical Approach for Estimating Rocket Noise and Acoustic Propagation Based on Second Source-Allocation Method From The National Aeronautics and Space Administration (NASA) Report SP-8072

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Abstract : This study utilizes NASA's SP-8072 semi-empirical model to predict rocket noise by employing the distributed source method to calculate overall sound pressure levels (OASPL) along the exhaust plume. Key factors such as exhaust velocity, nozzle geometry, and ambient conditions are considered to estimate acoustic loads generated during launch. A Python/MATLAB-based computational tool was developed to implement this method and validated using experimental data from scaled rocket models. The tool was further applied to predict acoustic loads for launch vehicle like the Ariane 5, which launched Vietnam's Vinasat satellite. This research provides an efficient and accurate approach to modeling rocket noise, minimizing the need for costly full-scale physical tests while improving the design and safety of launch systems.

Keywords : acoustic propagation, acoustic measurement, overall sound pressure level, fluid dynamics, semi-empirical approach

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