

## Numerical Study on Vortex-Driven Pressure Oscillation and Roll Torque Characteristics in a SRM with Two Inhibitors

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**Abstract :** The details of flow structures and the coupling mechanism between vortex shedding and acoustic excitation in a solid rocket motor with two inhibitors have been investigated using 3D Large Eddy Simulation (LES) and Proper Orthogonal Decomposition (POD) analysis. The oscillation frequencies and vortex shedding periods from two inhibitors compare reasonably well with the experimental data and numerical result. A total of four different locations of the rear inhibitor has been numerically tested to characterize the coupling relation of vortex shedding frequency and acoustic mode. The major source of triggering pressure oscillation in the combustor is the resonance with the acoustic longitudinal half mode. It was observed that the counter-rotating vortices in the nozzle flow produce roll torque.

**Keywords :** large eddy simulation, proper orthogonal decomposition, SRM instability, flow-acoustic coupling

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