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**Validation and Implementation of Optical Diagnostics for Particle Sizing in Rocket Motors**

Authors: [Paul V. Gomes](#); [NAVAL POSTGRADUATE SCHOOL MONTEREY CA](#)

**Abstract:** **Aluminum oxide**(Al<sub>2</sub>O<sub>3</sub>) particles of known size distribution were cast into a solid propellant which burned at temperatures less than the melting point of Al<sub>2</sub>O<sub>3</sub>. Thus, particles of known size distribution existed at the nozzle inlet and in the plume. Malvern particle sizing instruments were used to make measurements at these two location using a windowed subscale motor and the results were compared to the known distribution. In the motor, measurements were limited due to disruptive flow from the window purge gas. However, the unaffected larger modes were properly measured. In the plume, the measurements of the modes were quite accurate, but low signal strength resulted in some inaccuracies for the mass contained in each mode. A phase Doppler particle analyzer was adapted to an existing plume probe. Initial measurements at two radial locations were in good agreement with the expected size distribution. Particle sizers, Solid rockets.

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**Description:** Master's thesis

**Pages:** 45

**Report Date:** DEC 93

**Report Number:** A185872

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