

SPACE PROPULSION SYMPOSIUM (C4)
Propulsion System (2) (2)

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ENHANCED SOLID PROPELLANT BURN RATE MEASUREMENT TECHNIQUE USING X-RAY
REAL-TIME RADIOGRAPHY**Abstract**

For solid propellants one of the most important parameters is defining performance in terms of the propellant burning rate. Current employed techniques and analysis tools for X-Ray RTR do not provide the desired burning rate accuracy due to various reasons, some of which are related to the inherent x-ray characteristics (scattered radiation) and resulting image quality.

Survey of X-ray diagnostics analysis and the associated errors have recommended not using this technique for routine ballistics tools. Results using real-time X-ray indicate the best achieved resolution is only 3

This paper builds further on what has been achieved over the years. The monte carlo assessment method, previously researched for ultrasound method, will be analyzed and used for this x-ray RTR study. Uncertainty in temperature sensitivity of the propellant, which is derived from the burn rate, will also be covered in results. Results obtained by modifications to the measurement techniques, motor case design, varying optimum x-ray intensities (as a function of propellant thickness), and use of enhanced image processing tools, are presented.