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# INVESTIGATING IGNITION LEAD TIMES ACROSS FUEL VARIATIONS IN HYBRID ROCKET MOTORS

**Abstract**

Catalytic bed with hydrogen peroxide oxidizer igniters are significant for their reliable combustion performance in hybrid rocket motors. Central to achieving such performance is the determination of ignition lead times, a factor in the effective initiation of combustion. The main aim entails comparing ignition lead times across different fuel types while maintaining a consistent of 90 percent purity of hydrogen peroxide oxidizer, catalytic bed temperature, and pressure conditions. To date, experimentation has involved testing various diaphragm fuel inner diameters coupled with Polyester+Carbon Black propellant, revealing a difference of over 1.5 seconds in ignition lead time. The calculation of ignition lead time involves the strategic positioning of pressure transmitters within the combustion chamber, catalytic bed, and hydrogen peroxide line of the igniter to monitor pressure differentials. Ignition delay is subsequently computed from the observed variations in pressure. Accurate measurement of ignition delay is important as they impact hybrid motor performance.