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Thermomechanical Response of a Gas to Spatially Resolved Power Deposition Transients DAVID R. KASSOY, Mechanical Engineering (RET) University of Colorado, Boulder — Liquid propellant rocket engine (LPRE) instability is characterized by growing pressure oscillations that affect the integrity and performance of the system. Modeling and prediction have been topics of intense interest to designers for more than 60 years. LPRE combustion provides a wonderful opportunity to employ thermomechanical concepts and mathematical methodologies to quantify the response of combustion chamber gases to spatially distributed, transient thermal energy deposition. Nondimensional Euler equations, including a power deposition term in the energy equation are used to identify crucial parameters, time and length scales, as well as levels of energy deposition, relevant to LPRE performance. The objective is to provide first principles explanations of physical phenomena responsible for mechanical disturbances observed in operating LPRE's.

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