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A combustion model for studying the effects of ideal gas properties on jet noise. JERIN JOSEPH, The University of Texas at Austin, Aerospace Engineering Department, CHARLES TINNEY, The University of Texas at Austin, Applied Research Laboratories — A theoretical combustion model is developed to simulate the influence of ideal gas effects on various aeroacoustic parameters over a range of equivalence ratios. The motivation is to narrow the gap between laboratory and full-scale jet noise testing. The combustion model is used to model propane combustion in air and kerosene combustion in air. Gas properties from the combustion model are compared to real lab data acquired at the National Center for Physical Acoustics at the University of Mississippi as well as outputs from NASA's Chemical Equilibrium Analysis code. Different jet properties are then studied over a range of equivalence ratios and pressure ratios for propane combustion in air, kerosene combustion in air and heated air. The findings reveal negligible differences between the three constituents where the density and sound speed ratios are concerned. Albeit, the area ratio required for perfectly expanded flow is shown to be more sensitive to gas properties, relative to changes in the temperature ratio.

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