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Measurement of high frequency temperature fluctuations in high-pressure premixed combustion using laser Rayleigh scattering[1] HAN JUNE PARK, SANGEUN BAE, HYUNGROK DO, WONTAE HWANG, Seoul National University — In gas turbines, the high temperature and pressure combustion environment makes it difficult to measure physical properties such as flame characteristics. This measurement issue is also crucial when assessing combustion instability. Thermoacoustic combustion instability is known to occur when heat release and acoustic oscillations become in phase with each other. Due to the nature of heat release oscillation, modeling and measurement are difficult. To measure heat release oscillations, temperature fluctuation measurements are necessary. However, previous research in high temperature and pressure environments has been limited. In this study, we measured high frequency temperature fluctuations in high-pressure premixed combustion through density fluctuations, using non-intrusive laser Rayleigh scattering. The photon counting method was applied to quantify low intensity Rayleigh scattering. In addition, a high-speed camera was used to correlate the flame shape and combustion instability as pressure increases.

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