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Spatial Resolution of Combined Wavelength Modulation Spectroscopy with Integrated Cavity Output Spectroscopy for Atomic Oxygen Detection MAKOTO MATSUI, DAISUKE NAKAJIMA, Shizuoka Univ — For developments of thermal protection system, atomic oxygen plays important role. However, its measurement method has not been established because the pressure in front of TPS test materials is as high as a few kPa. Our group proposed combined wavelength modulation and integrated output spectroscopies based on the forbidden transition at OI 636 nm to measure the ground-state number densities. In this study, WM-ICOS system is developed and applied to a microwave oxygen plasma to evaluate measurable region. As a result, the estimated number density by ICOS could be measured as low as 10^{21} m^{-3} . For the condition, WM-ICOS was applied. The signal to noise ratio of the 2f signal was 40.4. Then, the sensitivity was improved about 26. This result corresponding to the measurement limit of the partial atomic oxygen pressure of 250 Pa. The sensitivity of WM-ICOS was found to enough to diagnose the shock layer in high enthalpy flows. However, the spatial resolution was as large as 8 mm. The size of the beam pattern depends on the cavity length, robustness of the cavity and accuracy of the cavity alignment. In this presentation, the relationship among these parameters will be discussed.

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