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Phase-modulated dispersion interferometry for electron-density determination of high-pressure plasma[1] KEIICHIRO URABE, The University of Tokyo, TSUYOSHI AKIYAMA, National Institute for Fusion Science, KAZUO TERASHIMA, The University of Tokyo — Phase-modulated dispersion interferometry (PMDI) is a laser interferometry technique that was first developed for measurement of electron density in large fusion reactors [1]. PMDI can eliminate the effect of nondispersive components in the refractive-index variation on the measured signals; therefore, it is mostly free from vibration of optical devices during the measurement. Also, configuration of the laser beam axis in PMDI is simpler than that in heterodyne interferometry. In this paper, we demonstrate the potential of PMDI for the diagnostics of low-temperature plasmas generated at high pressures. Most of the variation of the refractive index induced by the variation of gas density was eliminated by signal processing, and it contributed to accurate electron-density determination in high-pressure plasmas [2]. The measurement results for a pulsed-dc microdischarge in an atmospheric-pressure helium gas flow revealed that the electron density in the microdischarge was in the range between $4\text{x}10^{13}$ and $1.4\text{x}10^{14}$ cm^{-3}, and our PMDI system had a temporal resolution of 110 μs and a sensitivity of the line-integrated electron density of $7\text{x}10^{11}$ cm^{-2} respectively.

[1] T. Akiyama *et al.*, Plasma Fusion Res. **5**, (2010) S1041.
[2] K. Urabe *et al.*, J. Phys. D **47**, (2014) 262001.

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