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Development of novel atomic absorption spectroscopic method using optical frequency comb KEIICHIRO URABE, The University of Tokyo, OSAMU SAKAI, Kyoto University — For progress of atomic absorption spectroscopy including plasma diagnostics, we proposed a novel system of laser spectroscopic method for single electronic transitions using a frequency-comb laser source. The optical frequency comb is one of the newly developed coherent light sources and has potentials to be applied not only to accurate measurement of laser frequencies but also to various infrared spectroscopic measurements. In the novel method, the frequency-comb laser beam passes through tested plasma and then the frequency-comb laser beam is merged with an additional single-wavelength laser beam to generate beat signals by the interference. A power spectrum of the beat signals in the merged laser beam is recorded with a bandwidth of several tens of GHz which is sufficient to analyze whole spectrum of a single electronic transition. This method, named a frequency-comb interference spectroscopy (FCIS), enables us to measure single-transition absorption spectra without using a large-scale spectrometer or scanning the laser-beam frequency. We have evaluated the FCIS method in absorption profile measurements of argon metastable atoms in a small RF discharge.

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