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Azimuthal Doppler Effect in Optical Vortex Spectroscopy MITSUTOSHI ARAMAKI, Nihon Univ., SHINJI YOSHIMURA, Natl. Inst. Fusion Sci., YASUNORI TODA, Hokkaido Univ., TOMOHIRO MORISAKI, Natl. Inst. Fusion Sci., KENICHIRO TERASAKA, MASAYOSHI TANAKA, Kyushu Univ. — Optical vortices (OV) are a set of solutions of the paraxial Helmholtz equation in the cylindrical coordinates, and its wave front has a spiral shape. Since the Doppler shift is caused by the phase change by the movement in a wave field, the observer in the OV, which has the three-dimensional structured wave front, feels a three-dimensional Doppler effect. Since the multi-dimensional Doppler components are mixed into a single Doppler spectrum, development of a decomposition method is required. We performed a modified saturated absorption spectroscopy to separate the components. The OV and plane wave are used as a probe beam and pump beam, respectively. Although the plane-wave pump laser cancels the z-direction Doppler shift, the azimuthal Doppler shift remains in the saturated dip. The spatial variation of the dip width gives the information of the azimuthal Doppler shift. The some results of optical vortex spectroscopy will be presented.

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