

Determination of the metastable and resonance excited atomic states populations in CCP Ar discharge using OES techniques.

K.A. Kurchikov^{a,b}, A.S. Kovalev^a, A.N. Vasilieva^a.

^aSkobeltsyn Institute of Nuclear Physics, Lomonosov Moscow State University,
Moscow, Russia.

^bLomonosov Moscow State University, Moscow, Russia.

In this work populations of the first two metastable and first two resonant atomic states in CCP Ar discharge have been measured using two independent optical emission methods. The first method is based on the comparison of radiation self-absorption effects for plasmas with two different effective sizes. The second method is based on the measurements of intensities ratios of certain lines which are sensitive to plasma parameters. It was shown, that the first method is preferable to use. The dependences of levels' populations on the different plasma parameters were obtained. In particular, it was shown, that the resonant state populations increase with increasing applied power, simultaneously the metastable state populations remain constant. For description of such populations' behaviors the collisional radiative model, containing the first 14 excited atomic states in Ar, has been built. Using this model we also obtain electron concentration and the electron energy distribution function (EEDF), which came out to be non-Maxwellian.