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Actinometry of O, N and F atoms[1] ANDREY VOLYNETS, Dept of Physics, Lomonosov Moscow State Univ, Russian Federation, DMITRY LOPAEV, Skobeltsyn Institute of Nuclear Physics, Lomonosov Moscow State Univ, Russia, ALEXEY ZOTOVICH, Dept of Physics, Lomonosov Moscow State Univ., Russian Federation, SERGEY ZYRYANOV, Skobeltsyn Institute of Nuclear Physics, Lomonosov Moscow State Univ. Russia, ALEXANDER RAKHIMOV, Skobeltsyn Institute of Nuclear Physics, Lomonosov Moscow State Univ, Russia — Actinometry is optical non-invasive diagnostics which is often applied for measurements of atom concentrations in various plasmas. However, its accuracy relies on knowledge of both apparent excitation cross sections and electron energy distribution function in plasma. Applicability and accuracy of this method for measuring the absolute concentrations of O, N and F atoms in discharge plasma was studied. For this purpose, concentrations of the atoms produced in ICP discharge were measured by two methods: actinometry and appearance potential mass-spectrometry (APMS). Comparison of the results showed good agreement between both methods in a range of experimental errors for oxygen. Since the excitation cross sections for $O(3p^3P)$ and $O(3p^5P)$ states (most often used in actinometry of atomic oxygen) are well known and experimentally validated, the influence of the EEDF shape was accurately evaluated. Following this approach, the theoretical excitation cross sections of $N(3p^4P^o)$, $F(3p^2P^o)$ and $F(3p^4D^o)$ states (used for actinometry of N and F atoms) were absolutely calibrated at first time by fitting the actinometry results to that of APMS.

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