A time-dependent model for simulation of Ne-like and F-like resonance lines emitted from laser produced plasmas

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Abstract

We describe a collisional radiative code to simulate the Ne-like and F-like resonance lines emitted from laser produced plasma. Ions and excited levels density are calculated by solving rate equations using implicit-finite difference method for steady state, quasi steady state and time-dependent conditions. The code calculates intensities of Ne-like $1s^2\,2s^2 2p^6 \rightarrow 1s^2 2s^2 2p^5\,nl$ and F-like $1s^2\,2s^2 2p^5 \rightarrow 1s^2 2s^2 2p^4\,nl$ resonance lines emitted from various species, Z=18 to 32 i.e. from argon to germanium. Doppler and Stark broadening line shapes are included in the code. Absorption of resonance lines is determined using an escape factor approximation. The ratios of optically thin various Ne-like to F-like resonance lines are calculated to measure electron temperature and electron density. The results are compared with experimental spectra obtained from X-ray laser media.