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12.15 Dual filter imaging of ionization dynamics in high-temperature plasmas

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Mass injection has many applications in magnetic fusion as well as laboratory high-temperature plasmas. Examples include gas puffing, dust or powder injection, pellet or granule injection. Further improvement of the mass technology requires diagnostics that can characterize the dynamics of the mass interaction with plasmas. Fast imaging can be used to characterize the ionization dynamics such as the propagation of ionization front, which moves at the thermal sound or higher speed, and mixing of the neutral atoms and the ambient plasma. Multi-wavelength spectral imaging would be necessary since different parts of the plasma give different spectral signatures. Here we describe a dual-spectral imaging technique based on a monochromatic camera sensor and filters with two passing optical wavelengths. The method is compared with alternatives such as colored cameras and mono-chromatic cameras using a filter wheel. Examples of the ionization dynamics using the method are given for several plasmas.

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