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Near IR Continuum Radiation From Metal Halide HID Lamps

J.E. LAWLER, M.T. HERD, University of Wisconsin — A recent study demonstrated that the near IR continuum from pure Hg High Intensity Discharge (HID) lamps is primarily due to electron- atom bremsstrahlung over a pressure range from 8 bar to more than 200 bar [1]. The study compared absolute spectroradiometric measurements to radiation transport simulations using new (larger) electron-Hg atom bremsstrahlung coefficients. The absence of significant molecular radiation in the near IR from 230 bar Ultra High Pressure lamps was unexpected. Near IR losses from Metal Halide (MH) HID lamps are typically 20 to 30% of input power. A quantitative, microscopic understanding of these losses is very desirable since MH lamps are more and more widely used for general illumination. The near IR from MH lamps is emitted by the arc core. It is composed of a strong continuum, many weak atomic lines, and negligible molecular radiation. In an effort to understand the Near IR losses from MH lamps, we are mapping the spatial and spectral dependence of this radiation. The maps are being compared to radiation transport simulations. Additives provide most of the free electrons in MH lamps, and additive segregation complicates the analysis of near IR emission. Our approach to this problem and progress to date will be described.

[1] J. E. Lawler, A. Koerber, and U. Weichmann, J. Phys. D: Appl. Phys., in press (2005).

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