

Abstract Submitted  
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**Source formulation for fluid turbulence simulations from atomic physics differential cross sections** S.H. MULLER, C. HOLLAND, G.R. TYNAN, M. XU, J.H. YU, UCSD — The derivation of the correct functional form of source terms in plasma fluid theory is revisited. The relation between the fluid source terms and atomic physics differential cross sections is established for particle-impact ionization. It is shown that the interface between atomic and plasma physics is completely described by three scalar functions of the incident particle energy, which are properties of the differential cross sections only. For electron-impact ionization, the BEB and BED models [Y.-K. Kim and M. E. Rudd, Phys. Rev. A, 50 (1994) 3954] are used to calculate these functions analytically, yielding expressions that both accurately capture the physics and can be efficiently evaluated within fluid simulation codes. The source terms explain the observed electron temperature regimes in a wide variety of basic plasma physics experiments, including the trends across different gases.

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