

Modeling dissociation of molecular hydrogen

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Abstract. Detailed multi-level, self-shielding calculations of molecular hydrogen photodissociation fronts show that the commonly used 3-level approximation (Tielens & Hollenbach (1985)) frequently breaks down and gives inaccurate results for the photodissociation and heating rates. One possibility is the use of the extensive molecular hydrogen model recently included in CLOUDY (Shaw, *et al.* (2005)). However the resulting models are very time consuming, therefore we present improved approximations for the Solomon rate, the main destruction mechanism for a broad range of physical parameters (PDR density, incident FUV flux: G0) by modifying the rates given by Draine, & Bertoldi (1996). The behavior of typical PDR models in the transition region, where molecular hydrogen forms, is then compared using the detailed model in CLOUDY and the two other approximations. We are also examining the inclusion of this approximation into the self-consistent dynamic models of steady ionization fronts discussed in Henney, *et al.* (2005).

Keywords. methods: numerical, astrochemistry, ISM: molecules

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