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Theoretical study of the $D^- + H_2 \rightarrow H^- + HD$ reaction at low energies[1] CHI HONG YUEN, University of Central Florida, MEHDI AYOUZ, LGPM, CentraleSupelec, Universit Paris-Saclay, VIATCHESLAV KOKOOULINE, University of Central Florida — The rearrangement reaction $D^- + H_2 \rightarrow H^- + HD$ has been studied in a recent experimental work at low temperatures (10,19,and 23K) [1]. An upper limit of about 10^{-18} cm^3/s for the rate coefficient is obtained. A fully-quantum reactive scattering calculation of the rate coefficient is performed using the hyperspherical coordinates and the potential energy surface in Ref. [2]. Eigenchannel R-matrix approach with modified slow variable discretization [3] is used to represent continuum wave functions of the system to obtain the scattering matrix describing the scattering from the initial rovibrational channel of the H_2+D^- into possible channels of H^- + HD. At low collision energies between H_2 in the ground state and D^-, only three rotational channels of $HD(v, j)$ + H^- are open for the reaction with $v = 0$ and $j = 0, 1, 2$. Formulas for the cross section and rate coefficient for reactive scattering in hyperspherical coordinates are derived. Preliminary results for the rate coefficient of the $D^- + H_2 \rightarrow H^- + HD$ reaction is obtained. [1]Endres *et al*, in press, PRA (2017) [2] Ayouz *et al*, JCP **132**, 19 (2010) [3] Yuen and Kokoouline, EPJD, **71**,19 (2017)

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