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Amir Zareian Jahromi* (amir.zareianjahromi@gmail.com), Tehran, Iran. *A transport model for thermodynamic estimation of cryogenic hydrogen.*

Hydrogen is a foundation element of the universe and has attracted attention as a key of the solution for the energy and environmental problem. However, liquid hydrogen shows strange behavior as compared to other field due to the nuclear quantum effect. Because of this effect it is difficult to comprehend the thermodynamic and transport properties of liquid hydrogen by using the usual method. Therefore several methods have been proposed to reproduce the time evolution of the molecules in which the nuclear quantum effect contributes to their behavior. However, since the previous studies are still verification stage of the methods, an effect of the nuclear quantum nature of hydrogen and its mechanism on the thermodynamics and transport properties have not been clarified in details. Especially, how the quantum nature would effect on the energy transfer in molecular scale has not been clarified. In this study, therefore, we investigated the effect of this quantum nature and its mechanism on the thermodynamics and transport properties of cryogenic hydrogen using classical molecular dynamics methods. We applied Centroid Molecular Dynamics methods, Ring Polymer Molecular Dynamics methods, and Maximum Entropy numerical analytic continuation methods. (Received April 28, 2014)