

New type of phase transitions in hydrogen (deuterium) non-ideal plasma with chemical reactions of ionization and dissociation

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The Poisson shock adiabat (isentropes) of deuterium is calculated in the region of the density jump recorded in the experiment [1]. The authors of the experiment associated this jump with a phase transition. A distinctive feature of the computational model is taking into account the collective binding energy of atoms (cohesion) and the excluded volume. The calculation results demonstrate the presence of a phase transition and a density jump on the isentropes. A similar phase transition, the Dissociative Phase Transition (DPT), was previously found out at calculating the Hugoniot shock adiabat for deuterium [2]. A hypothesis is put forward about the existence of a new class of phase transitions: Dissociative and Plasma phase transitions (DPT and PPT) with the same topology of phase characteristics. This type of phase transitions was first considered by Norman G. E. and Starostin A. N. [3].

[1] Fortov V E, Ilkaev R I, Arinin V A and et al 2007 *Phys. Rev. Lett* **99** 185001

[2] Khomkin A L and Shumikhin A S 2014 *J. Exp. Theor. Phys.* **119** 453–459

[3] Norman G E and Starostin A N 1970 *High Temp.* **8** 381–408