

Abstract Submitted  
for the DFD17 Meeting of  
The American Physical Society

**The SPH consistency problem and some astrophysical applications** JAIME KLAPP, Instituto Nacional de Investigaciones Nucleares and Cinvestav-Abacus-IPN, LEONARDO SIGALOTTI, Departamento de Ciencias Básicas, Universidad Autónoma Metropolitana Campus Azcapotzalco, OTTO RENDON, IVIC-Venezuela and Cinvestav-Abacus-IPN, RUSLAN GABBASOV, Universidad Autónoma del Estado de Hidalgo, AYAX TORRES, Tecnológico de Estudios Superiores de Cuautitlán Izcalli — We discuss the SPH kernel and particle consistency problem and demonstrate that SPH has a limiting second-order convergence rate. We also present a solution to the SPH consistency problem. We present examples of how SPH implementations that are not mathematically consistent may lead to erroneous results. The new formalism has been implemented into the Gadget 2 code, including an improved scheme for the artificial viscosity. We present results for the “Standard Isothermal Test Case” of gravitational collapse and fragmentation of protostellar molecular cores that produce a very different evolution than with the standard SPH theory. A further application of accretion onto a black hole is presented.

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Date submitted: 19 Jul 2017

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