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**LBM study of flow-induced cavitation** GIUSEPPE GONNELLA, GOETZ KAEHLER, FRANCESCO BONELLI, Università di Bari, Via Amendola 173, 70126 Bari, Italy, ANTONIO LAMURA, Istituto Applicazioni Calcolo, CNR, Via Amendola 122/D, 70126 Bari, Italy — This work deals with the investigation of homogeneous cavitation, induced by a fast flow past a sack wall, by using the lattice Boltzmann method (LBM). Cavitation occurs, in a liquid, because of a pressure drop, which falls below a certain threshold, with the consequent formation of vapor bubbles [1]. The aim is to study the inception of cavitation by using LBM without any "ad hoc" cavitation model [2]. A LBM with a body force term and redefined equilibrium distribution functions is employed for describing the continuity and Navier-Stokes equations for a fluid locally satisfying the van der Waals equation of state [3]. In such a way, cavitation is directly described by the solution of the LB equation. The numerical study shows the formation of a depletion zone just under the obstacle, near its left edge, where the pressure reaches a minimum value. Cavitation occurs only when the pressure of this depletion zone reaches a value lower than the spinodal of the liquid branch, thus not confirming the Joseph's maximum tension criterion [4]. A detailed study of the flow field, of the Reynolds number effects, and of the developed cavitation regime are presented. [1] C. E. Brennen, Cavitation and Bubble Dynamics (Oxford University Press, 1995) [2] See for example M. Darbandi and H. Sadeghi, Numer. Heat Transfer A 58, 505 (2010). [3] A. Coclite, G. Gonnella, and A. Lamura, Phys. Rev. E 89, 063303 (2014). [4] G. Falcucci, E. Jannelli, S. Ubertini, and S. Succi, J. Fluid Mech. 728, 362 (2013).

Giuseppe Gonnella
Università di Bari, Via Amendola 173, 70126 Bari, Italy

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