Dynamic behaviour of a two-microbubble system under ultrasonic wave excitation

Xiao Huang, Qian-Xi Wang, A-Man Zhang, Jian Su

PII: S1350-4177(18)30023-3
DOI: https://doi.org/10.1016/j.ultsonch.2018.01.012
Reference: ULTSON 4049

To appear in: *Ultrasonics Sonochemistry*

Please cite this article as: X. Huang, Q-X. Wang, A-M. Zhang, J. Su, Dynamic behaviour of a two-microbubble system under ultrasonic wave excitation, *Ultrasonics Sonochemistry* (2018), doi: https://doi.org/10.1016/j.ultsonch.2018.01.012

Dynamic behaviour of a two-microbubble system under ultrasonic wave excitation

Xiao Huang[a,d], Qian-Xi Wang[b,c], A-Man Zhang[a], Jian Su[d,*]

[a] *College of Shipbuilding Engineering, Harbin Engineering University Harbin 150001, P. R. China*
[b] *School of Mathematics, The University of Birmingham Ring Rd N, Birmingham B15 2TS, United Kingdom*
[c] *School of Naval Architecture, Dalian University of Technology, Dalian 116024, P. R. China*
[d] *Nuclear Engineering Program, COPPE, Universidade Federal do Rio de Janeiro CP 68509, Rio de Janeiro 21941-972, Brazil*

Abstract

Acoustic bubbles have wide and important applications in ultrasonic cleaning, sonochemistry and medical ultrasonics. A two-microbubble system (TMS) under ultrasonic wave excitation is explored in the present study, by using the boundary element method (BEM) based on the potential flow theory. A parametric study of the behaviour of a TMS has been carried out in terms of the amplitude and direction of ultrasound as well as the sizes and separation distance of the two bubbles. Three regimes of the dynamic behaviour of the TMS have been identified in terms of the pressure amplitude of the ultrasonic wave. When subject to a strong wave with the pressure amplitude of 1 atm or larger, the two microbubbles become non-spherical during the first cycle of oscillation, with two counter liquid jets formed. When subject to a weak wave with the pressure amplitude of less than 0.5 atm,

*Corresponding author. Phone: +55 21 3938 8448; Fax: +55 21 3938 8444.
Email address: sujian@nunclear.ufrj.br (Jian Su)