Abstract Submitted
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Theoretical Study on Propagation of Pressure Wave in a Rectangular Duct Containing Spherical Bubbles[1] JUNYA KAWAHARA, KAZUMICHI KOBAYASHI, MASAO WATANABE, Division of Mechanical and Space Engineering, Hokkaido University — Pressure waves propagating in bubbly liquids are affected by the motions of bubbles. Several mathematical models for bubbly liquids have been proposed in order to investigate the acoustic characteristics of bubble cloud. The models are classified into two types: one is the continuum model [e.g., van Wijngaarden, J. Fluid Mech. 33, 465-474 (1968)] and the other is the discrete model [e.g., Fujikawa and Takahira, Acustica 61, 188-199 (1986)]. The continuum model composed of the averaged equations for bubbly liquids treats the macroscopic behavior of bubble cloud. In contrary, the discrete model describes the motion of bubbles individually taking account of bubble/bubble interactions. The aim of our study is to investigate the validity of the continuum model by treating each bubble with the interaction. The present work theoretically investigates the propagation of pressure waves in a rectangular duct containing spherical bubbles with the discrete model [Takahira et al., JSME Int. J. Ser. B 38, 432-439 (1995)]. The results show that the propagation velocities of pressure waves obtained from the present study agree well with those obtained from the continuum models.

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