Abstract Submitted
for the DFD11 Meeting of
The American Physical Society

Numerical Study on Focusing of Ultrasounds in Microbubble-enhanced HIFU YOICHIRO MATSUMOTO, KOHEI OKITA, SHU TAKAGI, The University of Tokyo — The injection of microbubbles into the target tissue enhances tissue heating in High-Intensity Focused Ultrasound therapy, via inertial cavitation. The control of the inertial cavitation is required to achieve the efficient tissue ablation. Microbubbles between a transducer and a target disturb the ultrasound propagation depending on the conditions. A method to clear such microbubbles has been proposed by Kajiyama et al. [Physics Procedia 3 (2010) 305-314]. In the method, the irradiation of intense ultrasounds with a burst waveform fragmentize microbubbles in the pathways before the irradiation of ultrasounds for tissue heating. The vitro experiment using a gel containing microbubbles has showed that the method enables to heat the target correctly by controlling the microbubble distribution. Following the experiment, we simulate the focusing of ultrasounds through a mixture containing microbubbles with considering the size and number density distributions in space. The numerical simulation shows that the movement of the heating region from the transducer side to the target by controlling the microbubble distributions. The numerical results elucidate well the experimental ones.

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Date submitted: 03 Aug 2011 Electronic form version 1.4