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History force effects on contrast agent microbubbles in an ultrasound field[1] VALERIA GARBIN, University of Twente, BENJAMIN DOLLET, Universite Rennes 1, LEEN VAN WIJNGAARDEN, NICO DE JONG, DETLEF LOHSE, MICHEL VERSLUIS, University of Twente — We study experimentally the radial and translational dynamics of an ultrasound contrast agent microbubble pair pulsating in an ultrasound field. The two bubbles attract each other through the so-called secondary Bjerknes force; quantifying these bubble-bubble interactions is therefore crucial for optimized medical imaging protocols. Using optical tweezers, we trap and control the distance between two microbubbles (BR-14, Bracco Research S.A., Geneva). We position the bubble pair away from the sample chamber wall, to prevent wall effects and quantify purely the acoustic bubble-bubble interaction and the dissipation due to viscosity in the fluid. The ultra-high speed Brandaris camera recorded the bubble dynamics at 15 million frames per second; from the optical measurements we track the instantaneous bubble radii and positions. We write a force balance for each bubble, assuming a no-slip boundary condition since the bubble interface is coated with a lipid monolayer to prevent dissolution. By comparison with the experimental results, we find that history effects are crucial to correctly account for the viscous forces.

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