Nonlinear Dynamics of an Encapsulated Microbubble Contrast Agent

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Ultrasound contrast agents (UCAs) provide excellent potential applications for biomedical ultrasound imaging, as well as for transport and delivery of various therapeutic substances. Perception of encapsulated microbubble dynamics is essential for extending its biomedical applications in order to develop new drug or gene delivery techniques and also for improving diagnostic ultrasound imaging. Nonlinear oscillations of UCAs under action of an ultrasound field are not fully understood. In this paper complex behavior of encapsulated microbubble is investigated theoretically by altering different substantial parameters using chaos theory. It is found that the chaotic behavior of microbubble increases in high pressure amplitudes, moreover it is shown that the stability of microbubble is increased by utilizing high magnitudes of applied frequency. It is concluded that the shell has a significant role on UCA behavior.