Ph.D.Thesis of Salahaddin University-Erbil Academic Staff Studied Abroad

Title of thesis:THREE DIMENSIONALACOUSTIC MICROBUBBLEDYNAMICS NEAR RIGIDBOUNDARY

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Summary (Abstract):

Dynamics of cavitation microbubbles due to high intensity ultrasound are associated with important applications in biomedical ultrasound, ultrasonic cleaning and sonochemistry. Previous numerical studies on this phenomenon were for an axisymmetric configuration. In this thesis, a computational model is developed to simulate the three dimensional dynamics of acoustic bubbles by using the boundary integral method. A bubble collapses much more violently subjected to high intensity ultrasound than when under normal constant ambient pressure. A few techniques are thus implemented to address the associated numerical challenge. In particular, a high quality mesh of the bubble surface is maintained by implementing a new hybrid approach of the Lagrangian method and elastic mesh technique. It avoids the numerical instabilities which occur at a sharp jet surface as well as generates a fine mesh needed at the jet surface.

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