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System and device for improved ultrasound cavitation mapping

Stanford researchers have demonstrated a new passive cavitation mapping algorithm based on sound localization of multiple scatters of cavitation. It shows improved resolution as compared to existing passive cavitation mapping algorithms based on a basic beamforming. Existing methods exhibit axial imaging resolution limited by the finite point spread function of imaging transducers and bandwidth of cavitation signals. The proposed method can pinpoint the origin of spherical waves corresponding to the location of the imploding bubbles, in order to obtain high resolution images. The improved imaging resolution permits precise monitoring of cavitation. It also provides both spatial and quantitative information of cavitation activities. This new method can be useful in clinical applications such as image guided drug delivery.

Applications

- **Passive cavitation mapping** useful for various therapeutic and diagnostic applications such as image guided drug delivery and diagnostic ultrasound imaging

Advantages

- Improved imaging resolution as compared to existing passive cavitation mapping algorithms based on a basic beamforming
- Provides both spatial and quantitative information of cavitation activities
- Can pinpoint the origin of coherent spherical waves radiating from imploding bubbles

Publications

- Lee et al. High-resolution passive cavitation mapping by source localization from aperture-domain signals *Ultrasonics Symposium (IUS), 2017 IEEE International*
- Lee et al. Image-guided ultrasound/microbubble-mediated drug delivery platform with passive cavitation mapping *Ultrasonics Symposium (IUS),* 2017 IEEE International

Patents

- Published Application: 20190009108

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