Docket #: S17-280

Ultrasound Imaging with Spectral Compounding for Speckle Reduction

Stanford researchers at the Steven Chu Lab have developed and patented a method and apparatus to optimize speckle suppression in ultrasound imaging, usable for diagnostic purposes. This method uses Fourier-transform limited pulses for spectral compounding. The optimization of pulse shape allows for the optimization of the trade-off between speckle reduction and axial resolution. Compared to images without spectral compounding, this invention can reduce the speckle noise by 2-3X and dramatically improve image quality, as demonstrated in preliminary data.

Figure

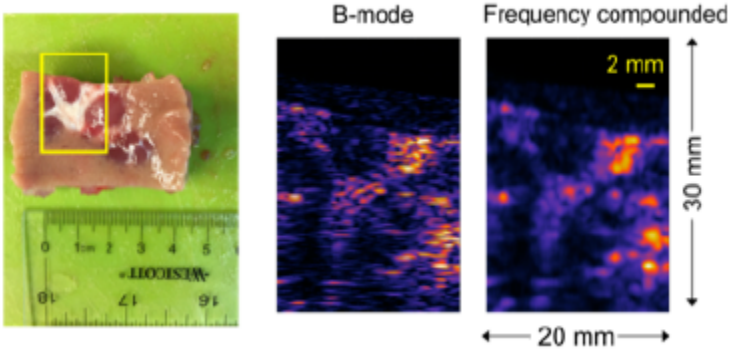


Figure description - Use of Fourier-filter speckle reduction method to image a piece of porcine kidney. Figure shows optical image (left panel) of a portion of kidney tissue imaged by ultrasound. The minor and major calyces appear white in the optical image. The same features can be identified in the conventional B-mode image (middle panel). The frequency compounded image shows reduced speckle while maintaining good spatial resolution.

Stage of Development - Proof of Concept

Applications

- Diagnostic Ultrasound Imaging

Advantages

- Method minimizes speckle for given spatial resolution
- Improves image quality
- Enables general diagnostic purposes

Publications

- Li, Y., & Chu, S. (2021). U.S. Patent No. *10,905,401*. Washington, DC: U.S. Patent and Trademark Office.
- Li, Y., Winetraub, Y., Liba, O., de la Zerda, A., & Chu, S. (2018). Optimization of the trade-off between speckle reduction and axial resolution in frequency compounding. *IEEE transactions on medical imaging, 38*(1), 107-112. DOI: 10.1109/TMI.2018.2856857

Patents

- Published Application: 20190008485
- Published Application: WO2019014070
- Published Application: 20210251612
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