Multiplicative speckle reduction in ultrasound imaging by combined frequency and angle compounding

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Technology description

Stanford researchers at Prof. Steven Chu’ s Lab have presented a combined frequency and angle compounding method that achieves a multiplicative speckle reduction as compared to that of either frequency or angle compounding alone. Using this method, a speckle reduction of more than 10-fold can be achieved practically. This invention enables high resolution images with the ability to visualize features such as tendons and small vessels that are hard to visualize by conventional ultrasound.

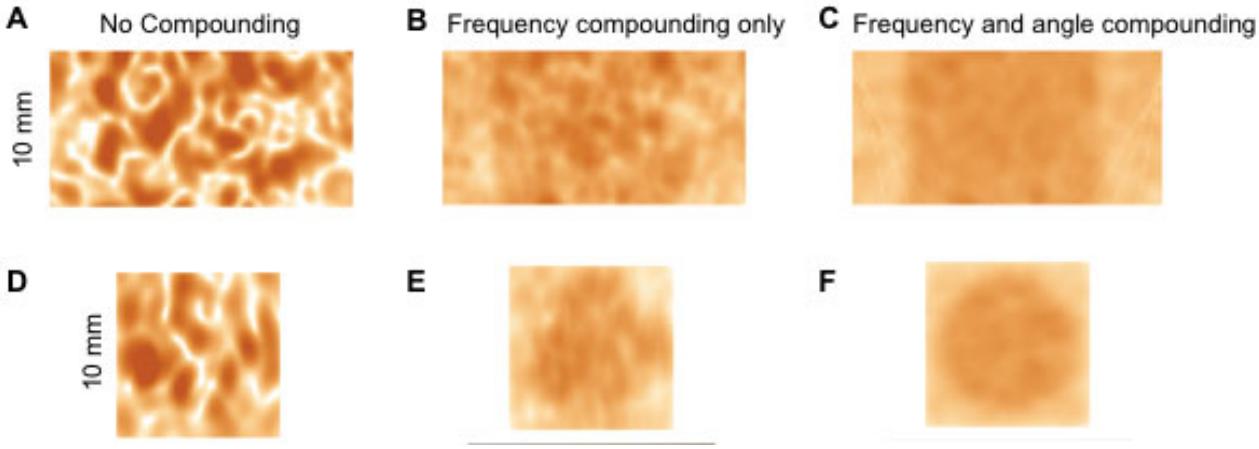

Figure 1 description -Images of the a phantom (A) at a single angle and a single frequency, (B) compounded at 9 frequencies and a single angle, and (C) compounded image at 9 frequencies and 9 angles. A hyperechoic region in the center has 3' the particle density compared to the rest. (D-F) are the simulated speckle with the corresponding conditions in (A-C). A speckle reduction of 9' is found in both the experiment and the simulation.

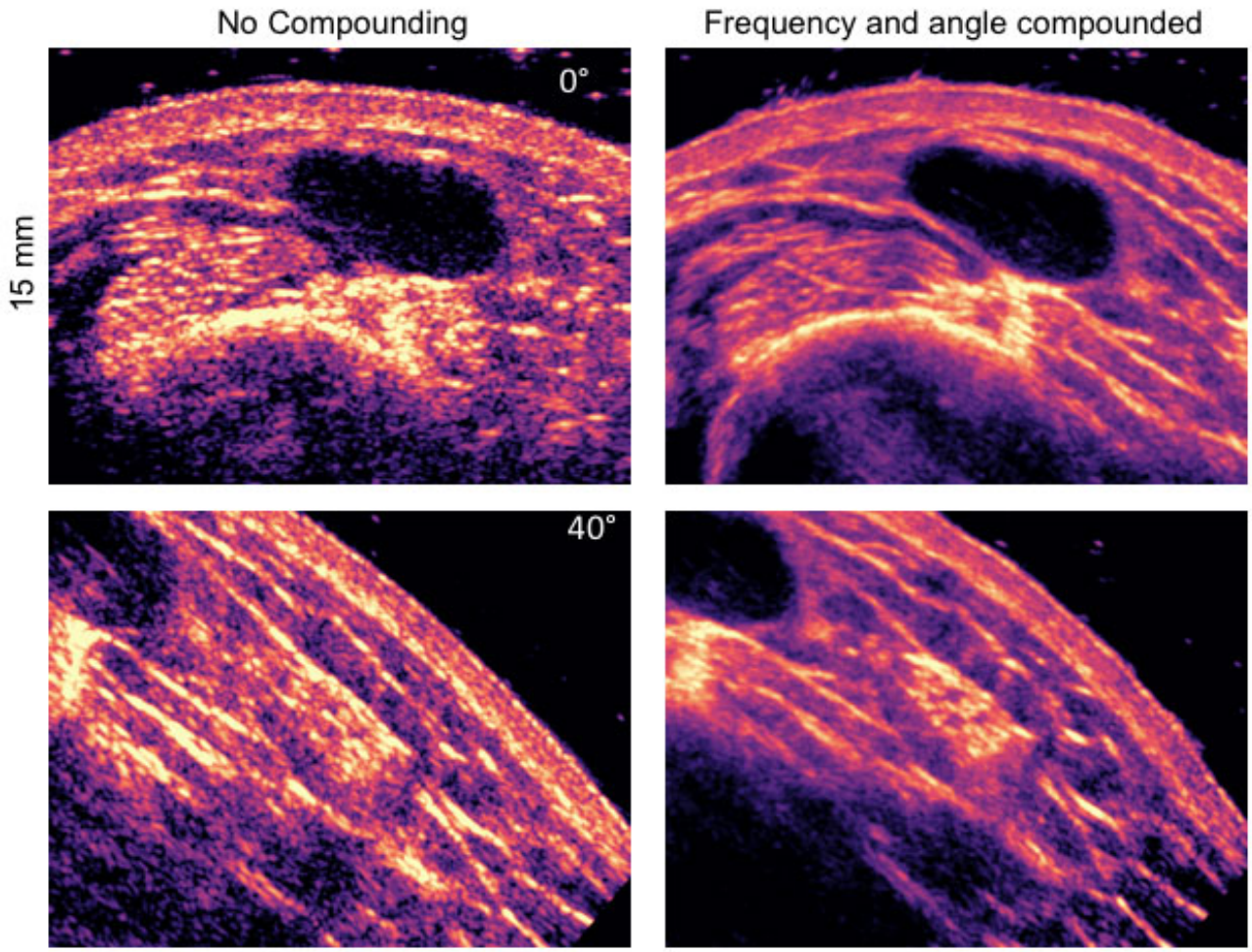

Figure 2 description -Comparison of the conventional B-mode image (no compounding) and frequency and angle compounded image of a human wrist.

Application area

Diagnostic Ultrasound Imaging

Advantages

Dramatically improves image quality Reduces speckle by more than 10xwhile maintaining good spatial resolutionImproves transverse resolution by ~ 3xTwo embodiments- Probe can be operated by robotic arm or free space optical coherence tomography device

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