Practical Applications of Synthetic Aperture Imaging

Synthetic aperture imaging has been a focus of research for almost 3 decades. The research carried out at the Center for Fast Ultrasound Imaging has demonstrated that synthetic aperture focusing not only can be used in-vivo, but that it also yields superior B-mode and blood flow images. In the last years synthetic aperture focusing has moved from the lab to commercial products. The implementations vary in their scope and purpose. Some scanners use synthetic aperture imaging to improve the detail and contrast resolution of the system. Others to increase the image uniformity. Yet others use synthetic aperture acquisition to achieve high frame rates and superior flow estimations. On the other end of the scale are the systems that utilize synthetic aperture techniques to reduce the data rate and take advantage of modern computer hardware. Retrospective transmit beamformation, zone sonography, and multiple angle flash imaging are just a few of the names used to describe the commercial implementations of synthetic aperture focusing. Although they sound like different algorithms, they are the same in their core, as revealed in this paper.