UNIVERSITY OF MINNESOTA
Driven to Discover℠

Nonlinear Post Beamforming Filter for Imaging

IP Status: Issued US Patent; **Application #:** 10/143,206

Volterra Model Post Beamforming Filter Preserves Image Detail

Ultrasound imaging using a dynamic nonlinear post-beamforming filter (e.g., based on a pth-order Volterra model) is capable of separating the linear and nonlinear components of image data (e.g., extracting the nonlinear components of the image data). The technique is applicable (but not limited) to both tissue and contrast agent nonlinearity. A system identification algorithm derives the filter coefficients. The filter based approach is capable of extracting a broad band of frequencies that allow for contrast enhancement while preserving image detail. True nonlinear interaction between these frequency components is accounted for by using a pth-order Volterra filter. The method for ultrasound imaging of matter in a region provides wave energy into the region, where the wave energy has a pulse spectrum centered at a fundamental frequency. Wave energy returned from the region is transduced to form a set of receive signals, which are beam-formed to provide data representative of at least a portion of the region. The linear and nonlinear components of the beam-formed data are separated based on a pth-order Volterra model (where p is equal to or greater than 2). The non-linear components of the beam-formed data can be processed to form an image.

MN-IP Try and Buy

Try

- Trial period is up to 12 months
- Trial fee is $10,000 for twelve months
- Trial fee is wavied for MN companies or if sponsoring $50,000+ research with the University
- No US patent expenses during trial period

Buy

- $25,000 conversion fee (TRY to BUY)
- Royalty rate of 3% (2% for MN company)
- Royalty free for first $1M in sales

Separates Linear and Nonlinear Components of Image Data

Most conventional ultrasound scanners create 2D tissue images, and while ultrasound wave energy is tissue is nonlinear, harmonic imaging still receives signals from tissue, limiting the specificity between contrast agent and tissue. Various improvements to ultrasound imaging for diagnostic use have been made in recent years, but even these enhancements suffer from limitations. This technology offers an improvement over existing ultrasound imaging using a dynamic nonlinear post-beamforming filter in order to separate linear and nonlinear

Technology ID

z02093

Category

Engineering & Physical Sciences/Instrumentation, Sensors & Controls
Life Sciences/Diagnostics & Imaging
Life Sciences/Human Health
Software & IT/Algorithms
Agriculture & Veterinary/Veterinary Medicine

Learn more

components of image data.

BENEFITS AND FEATURES:

- Dynamic nonlinear post-beamforming filter
- Separates linear and nonlinear components of image data
- Improves ultrasound imaging
- Beam-formed data representatives tissue region
- Applies (but is not limited) to both tissue and contrast agent nonlinearity

APPLICATIONS:

- Ultrasound imaging

Phase of Development - Conceptual

Interested in Licensing?

The University relies on industry partners to scale up technologies to large enough production capacity for commercial purposes. The license is available for this technology and would be for the sale, manufacture or use of products claimed by the issued patents. Please contact us to share your business needs and technical interest in this technology and if you are interested in licensing the technology for further research and development.

Researchers: Emad S Ebbini, PhD Professor, Department of Electrical and Computer Engineering