A New Shear Wave Speed Estimation Method for Shear Wave Elasticity Imaging

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Abstract

In this paper, a novel method to estimate the shear wave speed is proposed. This method is a modified version of the lateral Time to Peak (TTP) method that estimates the induced shear wave speed. Lateral TTP algorithm finds the instance at which the maximum displacement is detected at each lateral location under examination at a certain depth. In the proposed algorithm each temporal displacement data is enhanced by fitting a Gaussian distribution into it prior to finding instance at which the peak displacement detected. This algorithm is validated on tracked displacements generated from a finite-element model (FEM) that simulates the dynamic response of tissues to acoustic radiation forces. The proposed algorithm reveals a reconstruction of materials having shear modulus of 1.33 kPa as 1.28±0.05 kPa, 2.835 kPa as 2.84±0.23 kPa, and 8 kPa as 7.94±0.58 kPa. However, lateral TTP method revealed a reconstruction of materials having shear modulus of 1.33 kPa as of 1.31 ± 0.03 kPa, and 8 kPa as 2.77 ± 0.08. Finally, Gaussian fitting can be used to enhance results obtained from Lateral TTP algorithm by providing a more accurate reconstruction of materials shear modulus.
References


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Index Terms

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Keywords

Shear wave elasticity imaging, acoustic radiation force, finite element method, shear wave speed estimation, lateral Time to Peak, Gaussian fitting