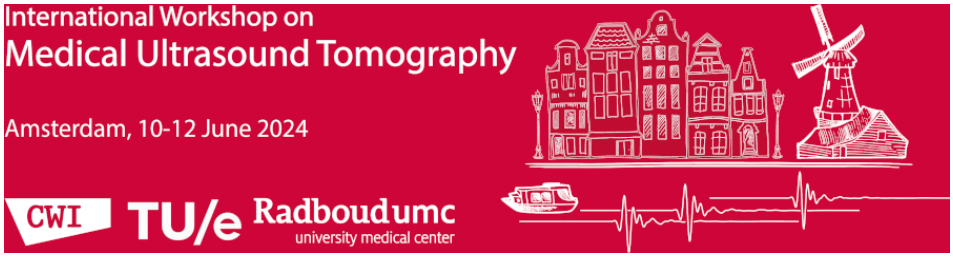

Contribution ID: **32** Type: **not specified**

Hybrid Gaussian Beam Pseudo-spectral Method for Efficient Wave Propagation in PAT

Tuesday, June 11, 2024 2:20 PM (20 minutes)

Photoacoustic tomography (PAT) is a hybrid imaging technique based on the photoacoustic effect. The PAT forward problem can be modelled as an initial value problem for the free space wave equation. The PAT inverse problem aims to recover an initial pressure from pressure time series recorded at sensors placed outside the region of interest. Despite the advances made in the recent years (parallel interrogation with up to 64 beams), the data acquisition time in state-of-the-art PAT scanners is still a bottle-neck resulting in sparse, limited angle data. The solution of inverse problems with incomplete data necessitate iterative methods involving repeated calls to the forward solver, which is the most compute intensive part of the process. Inspired by the Multiscale Gaussian Beam method proposed by Qian and Ying, we devise an efficient hybrid wave solver, leveraging Gaussian Beams for efficient and highly parallel propagation of high frequency components of the solution, and a pseudo-spectral method for accurate solution of the low frequency components. We discuss the accuracy and performance of our method on an example of solution of the forward problem in PAT.

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