Reconstruction Model for Blood Flow Tracking in the Left Ventricle

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ABSTRACT

The purpose of this research is to provide clinical images of blood flow in individual patient's left ventricle using ultrasound velocity data and change of left ventricle (LV) boundary. Doppler ultrasound data provides a directional component v^{doppler} of velocity $\mathbf{v}$ with the direction parallel to the beam direction. The dynamic motion of the LV contour can be tracked by a level-set based speckle tracking method. The inverse problem is to recover the full components of the velocity from the Doppler data and the LV boundary motion. Reconstruction of the velocity requires to connect the interrelation among the structure of fluid motion in LV, Doppler data and the time change of LV contour. We propose a reconstruction method for velocity that optimizes the use of Doppler ultrasound data, while minimizing the forward modeling errors due to the inaccurate tracking boundary geometry of LV. We developed a novel method of extracting LV motion and performed numerical simulation.

REFERENCES

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