

Estimation of regional displacement in myocardium muscle during heart cycle based on mathematical analysis of TDE images

- [H. Moladoust](#),
- [Manijeh Mokhtari Dizaji](#),
- [Z. Ojaghi-Haghighi](#),
- [F. Noohi](#),
- [A Khaledifar](#),
- [R. Jalalian](#),
- [H. Grailu](#)

Abstract

Tissue Doppler echocardiography (TDE) method has been developed which permits quantification of intramural myocardial velocities by detection of consecutive phase or frequency shifts of the ultrasound signal arising from the myocardium. In clinic conventionally are measured peak velocities for diagnosis and discriminates of heart disease however there is no report of the absolute displacement variation of myocardium.

The purpose of this research was a time integral assessment of TDE time-velocity profile images after converting image data to signal during mechanic phases of heart cycle as a new method for evaluation of absolute displacement of myocardium muscle based on numerical integral. We also used results of some integral function for evaluation of this method. For assessment of approximation of this method, we examined equal width of pixel steps for estimation of area under time-velocity curves (each pixel was equal 4 ms). The results of 1 to 5 pixels was near to getter (Coefficient of Variation was %0.2) and for assessment of accuracy, polynomial of orders one to four and exponential function plotted and results saved as bitmap images. At next stage, we calculate approximate value of area under curve by proposed algorithm (error value was %0.5).

For examining of presented method, the TDE time-velocity profiles were obtained in basal and middle segments of interventricular septum of a man suffering from coronary artery disease (CAD) with 3.2 MHz sector transducer at 151 to 210 fps. Time-velocity curves were saved as a full color images and were transferred to a personal computer for off-line analysis and then with use of proposed algorithm we could extract displacement during mechanic phases and total heart cycle. We are going to assess proposed method for discrimination of CAD patients.