# Min Xiong

**2017 Min Xiong--The Estimation Accuracy for Ultrasonic Doppler Velocity Distribution of** **Arterial Blood Flow(动脉血流的超声多普勒速度分布)Based on** **Coherent Plane Wave Compounding(相干平面波复合)**

**Purpose:**The velocity distribution of arterial blood flow is an important parameter to evaluate the physiological and pathological（生理病理学）conditions of human body. In the ultrasonic detection, the traditional focus mode(聚焦模式)has low frame rate(低帧频)in linear scan, poor detected accuracy（低检测精度）outside the focus points（焦点以外）, difficulty of quick estimation in two-dimensional area and some other limitations, is restrainedly used in clinic. Plane wave（平面波）doesn’t make beam forming（聚束）in emission, so the frame rate can reach 20 kHz.It can obtain the two-dimensional velocity distribution covered by the transducer at one emission and reception. And the detected region that is penetrated（穿透）by coherent plane wave compound with different inclination angle is helpful to improve the estimated accuracy of blood flow velocity distribution (BFVD). However, the key factors, inclination angle interval（间隔）and compound times, are lack of systematic investigation in terms of the estimated accuracy of BFVD.

**Methods:** In present study, an intensive research on this issue based on Field II platform is made. Plane wave imaging mode, coherent plane wave compound, autocorrelation estimation and other methods are used to deal with pulse-echo radio frequency signals to calculate the BFVD.

**Results:** In the simulation experiment, transducer emits plane waves of different inclination angle,then,the velocity is estimated respectively from the signals combined coherently(相干合成)by 3,5,7and 9 times. The results show that the normalized root mean square errors(归一化均方根误差) (NRMSE) are 0.24,0.30,0.35 and 0.36 when the inclination angle is set to ± 0.5,±7°,±14°and ±21°at the compound times of 3. The accuracy of the estimated results has an opposite trend with the increase of inclination angle interval.It also shows that the NRMSE are 0.24, 0.23, 0.22 and 0.22 when using 3,5,7 and 9 times to compound at a fixed angle interval of ± 0.5°.The accuracy of the estimation results is related slightly to the number of compound