Volumetric 3-D Vector Flow Measurements using a 62+62 Row-Column Addressed Array

Experimental results from volumetric 3-D vector flow measurements using a 62+62 row-column addressed (RCA) array are presented. A plane-by-plane steered transmit sequence and its post processing steps are described for obtaining 3-D vector flow in a volume. A modified version of the transverse oscillation (TO) velocity estimator is used, which exploits the focal lines generated with the tall elements of a RCA array. Validation of the method is made in a flow-rig system where circulating blood mimicking fluid produced a steady parabolic flow profile with a flow rate of 13.7 mL/s, translating to a peak velocity of 24.1 cm/s. A volume rate of 16.4 volumes per second is obtained, and estimated flow rates based on nine steered planes within the volume are investigated. A positive bias is found for all investigated planes lying in the range from 6.5% to 21.2% with the standard deviation being less than 4% for all cases. It is concluded that volumetric 3-D vector flow estimation is feasible with an RCA array with only 124 elements.