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Pulse wave analysis in a 180-degree curved artery model: Implications under physiological and non-physiological inflows[1] KARTIK V. BULUSU, MICHAEL W. PLESNIAK, The George Washington University — Systolic and diastolic blood pressures, pulse pressures, and left ventricular hypertrophy contribute to cardiovascular risks. Increase of arterial stiffness due to aging and hypertension is an important factor in cardiovascular, chronic kidney and end-stage-renal-diseases. Pulse wave analysis (PWA) based on arterial pressure wave characteristics, is well established in clinical practice for evaluation of arterial distensibility and hypertension. The objective of our exploratory study in a rigid 180-degree curved artery model was to evaluate arterial pressure waveforms. Bend upstream conditions were measured using a two-component, two-dimensional, particle image velocimeter (2C-2D PIV). An ultrasonic transit-time flow meter and a catheter with a MEMS-based solid state pressure sensor, capable of measuring up to 20 harmonics of the observed pressure waveform, monitored flow conditions downstream of the bend. Our novel continuous wavelet transform algorithm (PIVlet 1.2), in addition to detecting coherent secondary flow structures is used to evaluate arterial pulse wave characteristics subjected to physiological and non-physiological inflows. Results of this study will elucidate the utility of wavelet transforms in arterial function evaluation and pulse wave speed.

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