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Perturbation-induced secondary flow structures due to fractured stents in arterial curvatures[1] KARTIK V. BULUSU, CHRISTOPHER POPMA, LEANNE PENNA, MICHAEL W. PLESNIAK, The George Washington University
— An in vitro experimental investigation of secondary flow structures was performed downstream of a model stent that embodied a "Type-IV" stent fracture, i.e. complete transverse fracture of elements and element displacement (of 3 diameters). One part of the fractured stent was located in the curved region of a test section comprised of a 180-degree bent tube, and the velocity field measured with PIV. Secondary flow morphologies downstream of the stent were identified with a continuous wavelet transform (CWT) algorithm (PIVlet 1.2) using a 2D Ricker wavelet. A comparison of wavelet transformed vorticity fields of fractured and unfractured model stents is presented under physiological inflow conditions. During systolic deceleration, a breakdown in symmetry of vortical structures occurred with the unfractured stent, but not with the fractured model stent. Potential mechanisms to explain the differences in secondary flow morphologies include redirection of vorticity from the meridional plane of the bend to the normal plane and diffusion of vorticity.

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Michael Plesniak
The George Washington University

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