Abstract Submitted
for the DFD13 Meeting of
The American Physical Society

Secondary flow structures in the presence of Type-IV stent fractures through a bent tube model for curved arteries: Effect of circulation thresholding[1] SHADMAN HUSSAIN, KARTIK V. BULUSU, MICHAEL W. PLESNIAK, The George Washington University — A common treatment for atherosclerosis is the opening of narrowed arteries resulting from obstructive lesions by angioplasty and stent implantation to restore unrestricted blood flow. "Type-IV" stent fractures involve complete transverse, linear fracture of stent struts, along with displacement of the stent fragments. Experimental data pertaining to secondary flows in the presence of stents that underwent "Type-IV" fractures in a bent artery model under physiological inflow conditions were obtained through a two-component, two-dimensional (2C-2D) PIV technique. Concomitant stent-induced flow perturbations result in secondary flow structures with complex, multi-scale morphologies and varying size-strength characteristics. Ultimately, these flow structures may have a role to play in restenosis and progression of atherosclerotic plaque. Vortex circulation thresholds were established with the goal of resolving and tracking iso-circulation secondary flow vortical structures and their morphological changes. This allowed for a parametric evaluation and quantitative representation of secondary flow structures undergoing deformation and spatial reorganization.

[1]Supported by NSF Grant No. CBET- 0828903 and GW Center for Biomimetics and Bioinspired Engineering.

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Date submitted: 01 Aug 2013 Electronic form version 1.4