Abstract Submitted
for the DFD14 Meeting of
The American Physical Society

Examination of unsteady flow in a mildly curved vessel with stent-like wall protrusions: A tale of two vessels CHEKEMA PRINCE, SEAN D. PETERSON, University of Waterloo — New stent designs allow for better conformity to the vessel curvature, maintaining the complex primary and secondary flow patterns present in the native vessel. Despite design improvements, stent induced alterations in local vascular geometry are inevitable and have been associated with stent failure due to in-stent restenosis (ISR). The objective of this study is to elucidate the unsteady flow physics induced by stent implantation, accounting in particular for vessel curvature. The present study focuses on the investigation of unsteady flow through mildly curved vessels with protrusion patterns that emulate current stent designs using computational fluid dynamics (CFD). The modeled geometries include various protrusion frequencies, heights, and widths. Two different arterial velocities waveforms, mimicking the coronary and carotid artery environment, will be considered. A detailed examination of the flow environment induced by the stent presence will be correlated with derived parameters from the flow behavior, such as critical wall shear stress typically associated with ISR development. Specifically, the role of secondary flow in the convective transport of ISR stimuli to the vessel wall will be explored.

Chekema Prince
University of Waterloo

Date submitted: 30 Jul 2014 Electronic form version 1.4