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A numerical study of steady flow through a curved tube with wavy walls CHEKEMA PRINCE, MINGYAO GU, SEAN PETERSON, University of Waterloo — Flow through curved tubes has been studied for nearly a century owing to the practical industrial applications and general academic interest. More recently, interest in curved tubes has resurfaced due to the ubiquity of curvature in the vasculature and the resulting need to accurately model arterial vessels. Previous studies have focused primarily on circular cross sections and the roles of the Dean number and curvature ratio on the flow physics. In this study we examine the effect of wavy walls, that is, axially aligned ribs extending the length of the tube, on steady flow through mildly and finite curved tubes using computational fluid dynamics. Analytical work on the subject has been limited to low Dean numbers and small bump heights, thus we primarily focus on the impact of higher Dean number with large protrusions on the flow physics. The results are compared with those in circular cross section tubes at the same Dean number. Particular attention is paid to flow characteristics of interest in the vasculature, such as wall shear stress, that have been shown to stimulate biochemical pathways that trigger cell growth.

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