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Numerical simulations of the hemodynamics impact of stent-malapposition in a circular idealized coronary artery ERIC POON, ANDREW OOI, WEI PAN, YUN LIU, YUFEI YE, YUAN XUE, University of Melbourne, PETER BARLIS, Northern Health, Australia, STEPHEN MOORE, VLSCI, Australia — Pulsatile flow past two circular cylinder rings in tandem inside a circular pipe is carried out numerically at resting blood flow rate (around 200mL/min) to study the effect of stent-malapposition (distance between cylinders surface and the circular pipe wall) on the hemodynamics impact inside a coronary artery. The corresponding Reynolds number based on pipe diameter for this blood flow rate is $Re = 600$. Stent-malappostion is chosen to be 0.25–1 diameter from the circular pipe wall and the two circular cylinders are 36 diameters apart. At 0.25 diameter stent-malapposition, the flow between the cylinders and the wall slows down significantly as the boundary layers from the cylinder and the wall meet. At 0.5 diameter stent-malapposition, the flow between the leading cylinder and the wall increases substantially, leading to unsteady vortices rolling away from the wall and a dramatic increase in wall shear stress. However, the vortices behind the trailing cylinder are stable even though the two cylinders in tandem are 36 diameters apart as flow pusatility affects the velocity recovery behind the leading cylinder. At 1 diameter stent-malapposition, the vortices behind the leading cylinder become stable again.

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