Abstract Submitted
for the DFD14 Meeting of
The American Physical Society

The Direct Effect of Flexible Walls on Fontan Connection Fluid Dynamics MIKE TREE, KILEY FAGAN, AJIT YOGANATHAN, Georgia Inst of Tech — The current standard treatment for sufferers of congenital heart defects is the palliative Fontan procedure. The Fontan procedure results in an anastomosis of major veins directly to the branched pulmonary arteries bypassing the dysfunctional ventricle. This total cavopulmonary connection (TCPC) extends life past birth, but Fontan patients still suffer long-term complications like decreased exercise capacity, protein-losing enteropathy, and pulmonary arteriovenous malformations (PAVM). These complications have direct ties to fluid dynamics within the connection. Previous experimental and computation studies of Fontan connection fluid dynamics employed rigid vessel models. More recent studies utilize flexible models, but a direct comparison of the fundamental fluid dynamics between rigid and flexible vessels only exists for a computational model, without a direct experimental validation. Thus, this study was a direct comparison of fluid dynamics within a rigid and two compliant idealized TCPCs. 2D particle image velocimetry measurements were collected at the connection center plane. Results include power loss, hepatic flow distribution, fluid shear stress, and flow structure recognition. The effect of flexible walls on these values and clinical impact will be discussed.

Mike Tree
Georgia Inst of Tech

Date submitted: 01 Aug 2014 Electronic form version 1.4