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Blood flow characteristics in the aortic arch¹ LISA PRAHL WIT-
TBERG, STEVIN VAN WYK, MIHAI MIHAIESCU, LASZLO FUCHS, Linne
FLOW center, KTH Mechanics, Stockholm, Sweden, EPHRAIM GUTMARK,
Dept. of Aerospace Engineering, University of Cincinnati, OH, USA, PHILIPPE
BACKELJAUW, IRIS GUTMARK-LITTLE, Dept. of Pediatrics, Cincinnati Chil-
drens Hospital, OH, USA — The purpose with this study is to investigate the flow
characteristics of blood in the aortic arch. Cardiovascular diseases are associated
with specific locations in the arterial tree. Considering atherogenesis, it is claimed
that the Wall Shear Stress (WSS) along with its temporal and spatial gradients
play an important role in the development of the disease. The WSS is determined
by the local flow characteristics, that in turn depends on the geometry as well as
the rheological properties of blood. In this numerical work, the time dependent
fluid flow during the entire cardiac cycle is fully resolved. The Quemada model is
applied to account for the non-Newtonian properties of blood, an empirical model
valid for different Red Blood Cell loading. Data obtained through Cardiac Mag-
netic Resonance Imaging have been used in order to reconstruct geometries of the
the aortic arch. Here, three different geometries are studied out of which two display
malformations that can be found in patients having the genetic disorder Turner's
syndrome. The simulations show a highly complex flow with regions of secondary
flow that is enhanced for the diseased aortas.

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Lisa PrahL Wittberg
Linné FLOW center, KTH Mechanics, Stockholm, Sweden

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