

9 September 2008

Open Postdoctoral Research Position at Rice University: “A Novel Approach to Cardiac Replacement with Continuous Flow Pumps.”

Applications are invited for a position as Postdoctoral Fellow in the group “Complex Flows of Complex Fluids” led by Prof. Matteo Pasquali at Rice University. The goal of the research project is to formulate and validate a mathematical and computational model of the flow and blood damage (hemolysis and thrombosis) in an implantable blood pump. The work is part of a team project on the development of an implantable Total Artificial Heart (TAH) based on two rotary blood pumps. The key research goal of this postdoctoral researcher will be to arrive at a model which is rooted in the physics and biophysics of blood flow while, at the same time, sufficiently tractable to allow pump design on large parallel computer clusters. Anticipated challenges are (1) capturing the complex flow in the pump using an existing research CFD code, (2) modeling flow-induced hemolysis and thrombosis, (3) handling effectively large computational data sets on distributed memory computers, (4) relating simulations on short time scales to longer-time behavior of the device, (5) using experimental data (particle image velocimetry, in-vitro hemolysis experiments, in-vitro and in-vivo thrombosis studies) to refine and validate the models. The methods and models should be translatable to other blood-handling devices. A background in mathematical and computational modeling of fluid flow is required; experience with biological flows is desirable. Interest in experimental work and co-supervision of undergraduate and graduate students are desirable. Strong oral and written communication skills are required, because the project will involve interactions with research teams at RWTH Aachen University (joint development of the computational models), MicroMed Cardiovascular (blood pump engineering and fabrication), the Texas Heart Institute (system development, in-vitro and in-vivo studies of the TAH performance), and University of Houston (design of the control loops on the left and right pumps). The postdoctoral researcher will spend one or two research stays per year at the Chair for Computational Analysis of Technical Systems led by Prof. Marek Behr at RWTH Aachen and will have access to the PIV facility at MicroMed (located near the Rice campus). This position is funded through a grant by the National Institutes of Health, with initial funding provided for two years.

Applicants should email a curriculum vitae, a cover letter describing research experience and interests, and the names and email addresses of three or more references to:

Prof. Matteo Pasquali
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Kennedy Institute for Information Technology
Smalley Institute for Nanoscale Science & Technology
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Applications will be reviewed until the position is filled.
Rice University is an equal opportunity/affirmative action employer.