

Starting I Q1, 2017 there is one open PhD position (3 years) within the [BioTechMed Graz](#) funded flagship project

### **Image-based Learning in Predictive Personalized Models of Total Heart Function (ILEARNHEART)**

hosted at the Karl Franzens University Graz (KFU), the Graz University of Technology (TUG) and the Medical University Graz (MUG). The projects incorporates three interdisciplinary research groups headed by scientists from Applied Mathematics, form Medical Engineering and from Computer Science.

#### **Position WP2 - Numerical methods for hemodynamics and FSI problems:**

Supervisors: Prof. Gundolf Haase (Scientific Computing) & Prof. Gernot Plank (Computational Cardiology)

In the clinic image-based analysis of the dynamics of electrophysiological activity, deformation and blood flow is of pivotal importance in the diagnostic assessment of cardiac function. Computational *in silico* models of cardiac function are emerging as an important complementary modality, which aide in the quantitative analysis and interpretation of clinical data. Recently, we extended our own *in silico* modeling framework to enable simulations of the entire physics involved in a human heart beat that is, bioelectric activation, mechanical deformation and fluid flow. We seek to integrate these methodologies into a comprehensive *in silico* model of the left human heart, which shall be further developed towards a clinical research tool suitable for clinical applications such as e.g. valve replacement therapy. To gain clinical relevance the underlying modeling methodology must transition from using generic models to address fundamental mechanistic questions towards using personalized models, which provide clinically useful biomarkers for indicating or stratifying disease or allow for virtual testing of treatments and predicting outcomes acutely and longitudinally for a given patient.

For this position we are looking for a candidate holding a diploma or master degree in either Applied Mathematics/Numerical Mathematics/Scientific Computing or similar disciplines that provide a suitable background for developing and implementing methods for the fluid dynamics and for fluid-structure-interaction (FSI) in a parallel computing context. Software engineering skills and experience in code development are desirable. The candidate has to work in two areas:

- **Solver development:** integrative CFD solver components for the non-linear FSI problem have to be derived and implemented based on the existing code framework
- **Accelerator support:** Use of a hybrid MPI+OpenXX (OpenMP 4.5 and OpenACC 2.5) parallelization to support GPUs as well as Intel KNL.

The position is currently financed for three years with a chance for prolongation depending on the further funding success. The yearly salary will by 21300 EUR with estimated monthly living costs of 900 EUR in Graz. To apply for this position, please send your application by email to [gundolf.haase@uni-graz.at](mailto:gundolf.haase@uni-graz.at).

Your email should contain a pdf file as an attachment with the following information:

- Curriculum Vitae (CV)
- a short description of your qualifications and experience (i.e. list of courses, Diploma or Master thesis)
- a letter describing your scientific interests within the desired project
- names and email-addresses of at least two scientists willing to provide a reference