*MSc Position (Abschlussarbeit) on*

**Numerical Modelling of Crack Propagation for Applications in Energy and Environmental Geotechnics**

*in collaboration with the*

**Helmholtz-Centre Potsdam GFZ German Research Centre for Geosciences**

*and*

**Helmholtz Centre for Environmental Research - UFZ**

**Available position**

At Section 4.8 (Geoenergy) at the Helmholtz Centre Potsdam GFZ German Research Centre for Geosciences, various research projects ranging from the underground storage of energy or the disposal of nuclear waste to the development of deep geothermal energy systems, are being conducted. To assess the integrity and safety of such underground technologies or the exploitation potential of geothermal energy, numerical simulations are employed which capture the complex interaction of multiple physical phenomena such as heat transport, fluid flow, and deformation. In the last couple of decades, a large body of studies in the community have focused on the numerical simulation of crack propagation in porous media, and the open-source Finite Element platform OpenGeoSys, which is being developed at the UFZ, recently obtained capabilities to model such crack propagation through a recently established variational phase-field method. Being a relatively new approach in the geoscience community, a number of practical applications remain to be done. These applications include, for example, hydraulic fracturing interaction with existing weak interfaces (fractures, faults, etc.), crack propagation behavior under anisotropic in-situ stresses and/or heterogeneous rock properties, field scale models leveraging high-performance computers, or verification of the method experimental results to name a few.

We are looking for motivated Master-level student(s) that will help us address the above mentioned studies which will have great impact on our society. Particular problems assigned may be tailored according to the student’s specific interest and his/her skill set and close supervision and technical support will be provided so that it will lead to publications on high impact journals eventually.

**Requirements**

The suitable candidate must be enrolled in a MSc-level applied science or engineering program. To integrate into a team of scientists and developers, good communication skills and team working capabilities are required.

**Contact us**

UFZ contact: [keita.yoshioka@ufz.de](mailto:keita.yoshioka@ufz.de)

GFZ contact: [hannes.hofmann@gfz-potsdam.de](mailto:hannes.hofmann@gfz-potsdam.de)