The Institute of Water and River Basin Management is seeking to recruit a

Doctoral Researcher (f/m/d)

for the project

"HYbrid, NETwork-based modelling of HYdrological systems (HY-NET)"

Hydrological systems modeling is an indispensable tool for many tasks of high socio-economic interest, ranging from operational flood and drought forecasting to prediction of climate change. Recently, approaches from machine learning (ML) have been shown to outperform traditional hydrological modeling approaches, mainly due to their hyper-flexibility. Nevertheless, purely ML-based modeling depends on large data availability, ignores general knowledge about system functioning, and it does not easily extrapolate to unseen conditions. Combining general knowledge and learning-from-data in hybrid models is therefore currently seen as the most promising paradigm for hydrological and earth science modelling.

Funded by the KIT-Center Mathematics in Sciences, Engineering, and Economics (MathSEE), HY-NET addresses the challenge of hybrid modeling with an interdisciplinary approach, combining methods from hydrological as well as statistical sciences. The objective of HY-NET is to develop a prototype hybrid hydrological model as a Bayesian network, optimally combining domain knowledge as encoded in existing deterministic models with learning-from-data. The prototype development will take place both on the conceptual hydrological model SHM and the land surface model ICON-TERRA of the German Weather Service.

HY-NET will act as a bridge between the hydrological and the statistical sciences, we therefore seek an ambitious doctoral researcher with an interest in both the hydrological and the probabilistic challenges of hydrological systems modelling. Interdisciplinary is guaranteed through joint project coordination and PhD supervision by a mathematician (Prof Nicole Bäuerle) and a hydrologist (Dr Uwe Ehret). We provide an inspiring and internationally recognized scientific environment with access to the excellent computing facilities of KIT. HY-NET will be closely connected to the recently launched KIT Future Fields project "A new TEstbed for Exploring Machine LEarning in Atmospheric Prediction (TEEMLEAP)", offering plenty of opportunities for interdisciplinary cooperation and exchange. Further opportunities for training and exchange are offered by the KIT Centres for Climate and Environment (www.klima-umwelt.kit.edu) and Mathematics in Sciences, Engineering, and Economics (www.mathsee.kit.edu).

The following qualifications are required:
- Master's degree in either a) a subject related to environmental systems sciences with a focus on water (preferably Hydrology), or b) Mathematics.
- For a): a strong background in environmental systems modelling and mathematics. For b): a strong background in statistics and applied mathematics.
- Good programming skills (e.g. python, MATLAB, C++)
- Good writing and oral communication skills in English
- The ability to work independently and in a team within an interdisciplinary setting

We offer an attractive and modern workplace, ample opportunity for interdisciplinary collaboration, networking, and training, and a research topic with very high future potential. The position is initially limited to 3 years. Salary is competitive and with all social benefits (75% TVL-E13). We offer flexible working time models and a job ticket allowance. It is expected that based on the project work, the candidate will pursue a PhD.

Please apply via E-mail to uwe.ehret@kit.edu until **30/08/2021** including a detailed CV, scans of degree certificates, a letter of motivation, and contact information for two referees. We aim to balance the number of employees from diverse backgrounds (f/m/d) and therefore particularly invite female researchers to apply. If qualified, disabled persons will be preferred. Planned start date is **15/10/2021**.

For further information, please contact Dr. Uwe Ehret, uwe.ehret@kit.edu. Information about the Institute of Water and River Basin Management is available at https://hyd.iwg.kit.edu, information about the Institute of Stochastics at www.math.kit.edu/stoch/en.