

Postdoctoral Position in the DeepWave industry funded consortium at KAUST

The DeepWave industry funded consortium is looking for an outstanding postdoctoral researcher to undertake impactful research on the development and application of cutting-edge machine (deep) learning numerical methods for wave-equation-based processing, imaging, and inversion.

Wave phenomena are ubiquitous in science, and they extend to objectives ranging from global Earth discovery, to natural resources exploration, to subsurface monitoring, as well as nondestructive testing and medical imaging. However, our current ability to create detailed images of the interior of such bodies from remote measurements and accurately invert for physical properties often lacks the accuracy and resolution we seek for making informed decisions. Both shortcomings are usually attributed to the limitations in our measurements and in the underlying physical models. Machine learning (ML) techniques can be exploited to identify common patterns in the data and augment the physical laws of wave propagation, leading in turn to improvements accuracy and resolution.

The selected candidate will join the research groups of Prof. Tariq Alkalifah and Prof. Matteo Ravasi, within the Earth Science and Engineering (ErSE) school at King Abdullah University of Science and Technology (KAUST), Saudi Arabia. The candidate will be expected to develop novel methodologies, validate their effectiveness on field data, and contribute to scaling them to real-life problems in one or more of the following topics: (i) ML-assisted subsurface characterization and monitoring; (ii) Closing the gap between training and testing data; (iii) Physics-driven machine learning for geophysical modelling and inversion; and (iv) By-products of the AI revolution. Further details can be found at <https://deepwave.kaust.edu.sa/research>. Thus, the candidate is expected to have or about to have a PhD in a relevant topic, that includes geophysics, mathematics, physics, computer science or any related topics with a track record in relevant applications (processing, imaging and inversion).

In addition to initiating, developing, and delivering high-quality research, collaborate with students, the candidate will be expected to publish in leading peer-reviewed journals, present at international conferences, and contribute to improving the quality and efficiency of the consortium code base. Preference will be given to candidates with a strong publication record and proven experience in Python programming, source code versioning and management, machine and deep learning, as well as a solid understanding of wave phenomena and geophysical data analysis and imaging.

About the DeepWave Consortium

Established in 2022 by Prof. T. Alkalifah and Prof. M. Ravasi, the DeepWave Consortium aims to be a leading center for the research and development of machine learning algorithms on waveform data with applications ranging from the exploration and discovery of the Earth, to reservoir characterization and monitoring for oil and gas, geothermal, and CO₂ storage purposes. The Consortium fosters research that is guided by real life problems and its activities are inspired by the continuous feedback of the participating sponsors. Similar kinds of consortia have proven to be optimal vehicles for impactful research as well as developing students to be able to solve real life industrial-scale problems. Currently, nine industrial partners from all over the globe have joined the first phase of the Consortium (<https://deepwave.kaust.edu.sa/sponsors>).

About KAUST

Located on the Red Sea, 80 km north of Jeddah in Saudi Arabia, KAUST is an international graduate-level research university. KAUST offers state-of-the-art research facilities, including one of the largest

supercomputers in the world, and an attractive compensation package, including a tax-free salary upwards of US\$60,000 p.a., free fully-furnished on-campus housing, four weeks of paid annual leave (in addition to 15 national holidays), extensive health care coverage (medical and dental), relocation assistance, and free education at KAUST international schools for children. The appointment is for one year and will be renewed for up to three years, based on performance.

Basic Qualifications:

- A Ph.D. in Computational Geophysics, Computer Science, Applied Mathematics or similar field;
- Portfolio of relevant publications;
- Good programming skills in Python and proficiency in Torch and/or JAX;
- Proficiency in written and spoken English.

Differentiating Qualifications:

- Expertise in the development of seismic processing algorithms, high-performance computing, and/or large-scale inverse problems;
- Experience in developing open-source software and a track record in collaborative software development.

How to Apply:

Applications must be submitted to the DeepWave official mail (deepwave@kaust.edu.sa) with subject line '*DeepWave Postdoctoral Fellow application*' including the following materials: (i) a curriculum vitae including a list of publications; (ii) a 1-page cover letter briefly describing your research experience and interests; and (iii) the contact details of at least three references (to be contacted after the interview).