Postdoctoral Job Offer
with Del Duca – Académie des Sciences Foundation
at LMA Marseille, France

Project: **Large-scale inversion and imaging using acoustic waves and high-performance computing**

Geophysical tomography and seismic wave imaging, that have been the subject of intense studies over the last decades, have witnessed the growth of efficient and highly-accurate numerical methods, such as the spectral-element method, jointly with the flourishing of parallel and high-performance computational platforms. The recent spread of these techniques has led to the successful large-scale forward simulations of complex 3D problems and to the development of breakthrough inverse methods such as adjoint-based finite-frequency tomography, sensitivity-based analyses or ambient noise imaging.

At the interface between the fields of solid mechanics, acoustics and numerical modeling, the present job offer focuses on inverse problems with the aim of extending applications of the spectral-element method and petascale high-performance computing to (1) ocean acoustics and for (2) non-destructive material testing. Integration of complex media models will be pursued with a number of associated and identified issues as to account for, e.g., viscoelasticity or medium heterogeneity.

Depending on the successful candidate affinities, research activities might include (i) the mathematical description of the measurable signature of the quantities of interest, namely a set of physical or geometrical parameters, (ii) the development of dedicated and numerically efficient probing and identification strategies associated with full-waveform measurements, and (iii) the numerical implementation of these methods to tackle ambitious large-scale imaging problems linked with the applications of interest (1) and (2). Relevant publications by project team members, which can be found at http://komatitsch.free.fr/publications.html, include:

References

[1] J. Tromp, D. Komatitsch, Q. Liu, *Spectral-element and adjoint methods in seismology*, Commun. Comput. Phys., vol. 3(1), 1–32, 2008.

[2] P. Cristini, D. Komatitsch, *Some illustrative examples of the use of a spectral-element method in ocean acoustics*, J. Acoust. Soc. Am., 131(3), EL229–EL235, 2012

[3] C. Bellis, M. Bonnet, *Qualitative identification of cracks using 3D transient elastodynamic topological derivative: formulation and FE implementation*, Comput. Meth. Appl. Mech. Eng., vol 253, p. 89–105, 2013.

Applications and contact: The successful candidate will join the research group of Dimitri Komatitsch, Paul Cristini and Cédric Bellis at the CNRS Laboratory of Mechanics & Acoustics, Marseille, France. The project is funded by the Simone & Cino Del Duca Foundation and the postdoctoral fellowship will be awarded for an initial one year period with a possibility of a one year renewal. The candidate's experience must align with some of the project thematic fields, namely solids mechanics, acoustics, numerics or applied mathematics while research interests must be oriented towards the described applications. A doctoral degree is required and the thesis must have been defended at the time of appointment.

Applications, including a CV, a short statement of research interests and two to three reference letters, are to be sent to: **Dimitri Komatitsch** – komatitsch@lma.cnrs-mrs.fr
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