

Dear Prof. Igel,

My name is Rafael Abreu, I defended my PhD thesis on January 17th 2014 at the University of Granada, Granada, Spain, under the supervision of PhD. Daniel Stich and PhD José Morales.

I'm very interested in numerical methods in general and also theoretical work applied to seismology. In my PhD work we developed the formulation of a novel numerical method for solving differential equations in general and the wave propagation problem in particular. It develops alternative finite difference (FD) approximations based on complex numbers and investigates their properties in detail. The new schemes behave considerably different from classic FD, for example regarding their accuracy and dispersion properties. My PhD work shows how the introduction of complex steps provides an entirely fresh insight into the FD method in seismology, and suggests that including the imaginary part might benefit many other applications as well.

During my PhD work I also worked in developing adjoint equations and noise cross correlation sensitivity kernels of micro-continuum field theories (micropolar, microstretch and micromorphic media). That work took place at Princeton University with Jeroen Tromp and his group during two visits in 2011 and 2012. I also modified the SPECFEM3D code for the simulation of wave propagation in micropolar media (Cosserat media). I'm very familiar with Matlab and Fortran programming as well as the implementation of the Spectral Element Method in SPECFEM.

In the future I'm very interested in continuing developing and applying new theoretical work using numerical methods in general and solving basic problems in the geophysical field like seismic wave propagation in particular.

I hope you find my work interesting for your research purposes.

My best regards,

Rafael