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Modelling Stellar Convection

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Abstract content
   (Max 300 words)

Current stellar models rely on mixing length theory for the description of convection in the stellar material. Mixing length theory is an attempt to construct a computationally tractable theory of convection by analog with molecular transport mechanisms. It is used in all current stellar models. However, it suffers from several faults because of its simplistic representation of convection. In this project, I am investigating the possibility of replacing mixing length theory with alternative, more realistic theories of convection which are nevertheless computationally tractable. For example, a finite difference based simulation of the incompressible Navier-Stokes and Boussinesq equations. With the use of MPI to facilitate parallelisation, these simulations can be run on an appropriate scale for studying stellar convection. Preliminary investigations indicate the rate of heat transfer as predicted by mixing length theory is grossly underestimated in some regions. Results of this study may ultimately impact on the understanding of galaxy evolution.

Apply to be
 considered for a student
   award (Yes / No)?

Yes

Level for award
 (Hons, MSc,
   PhD)?

MSc

Main supervisor (name and email)
and his / her institution

Dr. Fabio Frescura, University of the Witwatersrand

Would you like to
 submit a short paper
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 Proceedings (Yes / No)?

No

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