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Modelling Small Scale Processes in the Ocean with Anistropic Lagrangian Averaging using Finite Elements

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We present an unstructured adaptive finite element method for solving the anisotropic Lagrangian-averaged Boussinesq equations (D. Holm, Physica D, 1999) which represent a turbulent closure model based on the "frozen turbulence" Taylor hypothesis. Our model is solved in terms of the unsmoothed momentum and uses a novel treatment of the pressure projection method, based on Hodge-Helmholtz decomposition, to enforce incompressibility for the smoothed velocity; this is necessary as the anisotropic filter does not commute with the divergence operator. We will explain our formulation and show results from the application to the study of open ocean deep convection.