

(1) LESNIC – Large Eddy Simulation Nansen centre Improved Code for research of the turbulent stably stratified planetary boundary layer

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(3) Available modes for the model runs: Research

(4) Components & processes: Atmosphere & Physical

(5) Brief model description

The **Large Eddy Simulation Nansen centre Improved Code (LESNIC)** was described in detail in Esau (2004) and Esau (2007). The model solves the momentum, temperature and continuity equations for incompressible Boussinesq fluid. It runs a fully conservative second-order central difference scheme for advection, the fourth-order Runge-Kutta scheme for time stepping, and a direct fractional step pressure correction scheme to solve the continuity equation. The computational mesh is an equidistant, staggered C-type mesh. The dynamic mixed closure (Vreman et al., 1994) models unresolved turbulent fluxes. In this closure, a mixing length scale is computed at every grid node and at every time step through a numerical solution of a deconvolution problem for filtered (grid-scale) velocities using the least square minimization method. The LESNIC model has participated in several intercomparison studies, which documented its performance in stably stratified (Beare et al., 2006; Esau & Byrkjedal, 2007) and convective (Fedorovich et al., 2004; Zilitinkevich et al., 2006) regimes.

The main research applications of LESNIC are related to investigations of long-lived stably stratified boundary layers and to development of a total turbulence energy theory and energy-flux balance closures (Zilitinkevich et al., 2008; Zilitinkevich et al., 2013).

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