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**Dispersive stresses in wind farms** ANTONIO SEGALINI, ROBERT BRAUNBEHRENS, ANN HYVARINEN, Linne FLOW Centre, KTH Mechanics, Stockholm, SWEDEN — One of the most famous models of wind farms is provided by the assumption that the farm can be approximated as a horizontally-homogeneous forest canopy with vertically-varying force intensity. By means of this approximation, the flow-motion equations become drastically simpler, as many of the three-dimensional effects are gone. However, the application of the horizontal average operator to the RANS equations leads to the appearance of new transport terms (called dispersive stresses) originating from the horizontal (small-scale) variation of the mean velocity field. Since these terms are related to the individual turbine signature, they are expected to vanish outside the roughness sublayer, providing a definition for the latter. In the present work, an assessment of the dispersive stresses is performed by means of a wake-model approach and through the linearised code ORFEUS developed at KTH. Both approaches are very fast and enable the characterization of a large number of wind-farm layouts. The dispersive stress tensor and its effect on the turbulence closure models are investigated, providing guidelines for those simulations where it is impossible to resolve the farm at a turbine scale due to grid requirements (as, for instance, mesoscale simulations).

Antonio Segalini
Linne FLOW Centre, KTH Mechanics, Stockholm, SWEDEN

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