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LES Exploration of the Near and Far Wake of Wings using a Novel Lifting and Dragging Line Model[1] DENIS-GABRIEL CAPRACE, GREGOIRE WINCKELMANS, PHILIPPE CHATELAIN, Universite catholique de Louvain — Several wing wakes are investigated by means of a hybrid Vortex Particle-Mesh-based LES flow solver, elected for its ability to capture wake dynamics with minimal spurious dispersion and diffusion. The broad spectrum of scales involved also entails the use of a novel Immersed Lifting and Dragging Line model to shed the vorticity from each wing. Advantageously, this technique waives the need for mollification in the spanwise direction, while remaining compatible with the relaxed CFL condition of vortex methods. Statistics of axial vorticity, velocity deficit, turbulence and circulation distribution are evaluated at different locations over 30 wing spans, in order to shed light on the transition from a coherent near wake to a turbulent vortex system at equilibrium in the far wake. The role of parasitic drag in such transition is also assessed, by comparing configurations with none, moderate and high profile drag.

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