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Wind-wave generation using interface tracking ESPEN AKERVIK, Norwegian Defence Research Establishment (FFI) — The wind-wave generation process in a periodic open channel is studied by means of Large Eddy Simulation, using the Volume of Fluid method to track the interface. The coupled system is initiated by imposing a turbulent air flow at $Re_\tau = 395$ on top of water at rest. Surface tension effects are excluded and the Froude number is chosen so as to fit equilibrium slow moving waves inside the computational domain. In the initial stage, the surface deformation consists of streamwise elongated narrow structures. These may be seen as footprints of the near wall streaks in the turbulent air flow. This phase is associated with linear growth in amplitude, and the behavior of the air flow is largely unaffected by the surface deformations. In the second stage, localized slow moving ($c/u_\tau < 10$) wave packets appear, and the air flow becomes linked to the waves. This phase is associated with exponential growth of the waves. In the third stage, non-linear interactions occur, resulting in redistribution of energy. The growth rates are compared to previous simulations and theoretical results.

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