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The results two-fluids numerical simulations of the wave breaking induced by modulations instability will be presented and comparisons between wind and no-wind solutions will be discussed. Simulations are performed by using the Gerris flow solver which models the two-fluids flow by the Navier-Stokes equations for a single incompressible fluid with variable fluid properties and uses a Volume of Fluid technique for the interface capturing. A two-dimensional assumption of the flow is made. The Benjamin-Feir instability mechanism is triggered by the side-band perturbations added to a fundamental component. Simulations cover the initial development of the instability till the end of the whole breaking process. In order to investigate the role of wind on the modulational instability and on the resulting breaking, a uniform wind, twice the phase speed, is assigned in the air phase.

The analysis is focused on the growth of the modulational instability and on the energy dissipation induced by the breaking. In order to better investigate the exchanges taking place at the air-water interface, a coordinate transformation proposed in the existing literature is used to map the air domain into a rectangular domain. Thanks to such transformation, it is possible to compute the pressures and tangential stresses acting ah the interface and thus to highlight the differences between the wind and no-wind case. It is shown that due to the flow separation there is a favourable pressure gradient about the wave crests whereas the tangential stresses are generally in favour of the wave propagation on the back of the wave but are opposed to the propagation along the forward face and in the wave trough. In agreement with what experimentally found, in presence of wind the growth rate of the side-bands is reduced compared to the corresponding no-wind solution. No substantial differences have been found in terms of the total energy dissipated by the whole breaking process although the dissipation rate for the wind case is noticeably higher.