Fragmented structures of lee waves over combined obstacles

Nikolay Makarenko (1,2) and Janna Maltseva (1,2)

(1) Lavrentyev Institute of Hydrodynamics, Novosibirsk, Russian Federation (makarenko@hydro.nsc.ru), (2) Novosibirsk State University

The problem on finite amplitude internal waves arising in a steady non-homogeneous flow over an uneven bottom is considered. Semi-analytical model deals with asymptotic solutions of the Euler equations of uniformly stratified fluid. Approximate solutions are constructed by the perturbation procedure combined with the Fourier method of modal expansion. Preliminary simulations used either of the first-order linear solution and the second-order non-linear solution (see [1,2]), and these numerical calculations found the fragmentation effect which occurs for near-field wave patterns forced by multi-bumped topography of finite extension. In this paper, we explain analytically the existence of sharp fronts which separate the flow domains having different wave scales. The results are illustrated numerically via modeling of wave structures generated by real bottom topography.

References

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