

# Nonlinear effects on the focussing of tsunami due to underwater lenses

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## Abstract:

In [1] the linear focussing of tsunami by underwater lenses was considered using diffraction theory. This proposed that under appropriate conditions underwater lenses could increase the intensity of tsunami three-fold. In this talk we consider the nonlinear propagation towards underwater lenses in the context of the variable coefficient Kadomtsev–Petviashvili (vKP) equation derived in [2]. Using the linear version of this equation we are able to construct equivalent asymptotic expressions for the focussing which qualitatively agree with [1], although with significantly smaller increase in the intensity. Numerical simulations of the nonlinear propagation then demonstrate that the focussing can be eliminated due to the acceleration of solitary waves over the underwater lenses. Furthermore, the vKP equation enables the downstream corrections due to finite width of the lenses to be investigated.

## References:

1. M.V. Berry, Proc. R. Soc. Lond. A, 463, 3055–3071 (2007).
2. X. Chen, Phys. Fluids A, 1, 2058–2060 (1989).