Nonlin. Processes Geophys. Discuss.,
https://doi.org/10.5194/npg-2017-32-AC1, 2017

Nonlinear Processes in Geophysics
Discussions
Open Access

Interactive comment on "Analytic Solutions for Long's Equation and its Generalization" *by* Mayer Humi

Ph.D Humi

mhumi@wpi.edu

Received and published: 8 August 2017

[12pt]article amsmath

Reply to Anonymous Referee #1

August 8, 2017

1. With all due respect to the referee the claim that

"Longs equation is a linear form of equation..." is incorrect.

The classical form of Long's (equation 2.23 in the paper) for the stream function ψ and the perturbation η (eq. 2.28) are BOTH NONLINEAR equations.

In the literature some authors IGNORE the nonlinear terms to obtain eq. 2.47 . However this is a singular limit of the equation and some of the "physical contents" of the solution is lost.(e.g the dependence of ψ on the height).

2. Solutions of Long equation are used routinely in the experimental analysis of gravity waves. Therefore one can not underestimate the practical importance of this equation (see my bibliography for references). (Many topographical obstacles are of moderate heights)

3. The referee seems to be unaware of my previous paper: "Time Dependent Long's Equation, Nonlin. Processes Geophys., 22, pp. 133-138 (2015)". In which I offered an extension of Long's equation to time dependent flows.

4. The NOVEL part of the current paper consists of a sequence of transformations

which "somehow" linearize Long's equation and lead to analytic form of the solution WITHOUT scarifying any of the physical contents of the equation. In the process we find also "solitonic form solutions" of this equation which never appeared in the literature before. The solutions presented also show how the amplitude of the gravity waves depend on the height.

5. The statement that Long's equation requires "particular form of the upstream flow" is incorrect. As was shown in the paper e.g eq 2.44 (as the referee admits).