

## ***Interactive comment on “Variational modelling of extreme waves through oblique interaction of solitary waves” by F. Gidel and O. Bokhove***

### **Anonymous Referee #1**

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The paper re-examines the problem of oblique interaction of a plane soliton with a rigid boundary. This problem is known as the Mach reflection and has been studied within the framework of the unidirectional Kadomtsev–Petviashvili (KP) equation. In the reviewed paper a variational approach is used to derive a more general the bidirectional Benney–Luke (BL) set of equations which represent a shallow-water asymptotic equivalent of the three-dimensional set of hydrodynamic equations for water waves. Within the derived BL set equations one can study wave propagation in two horizontal directions, whereas for unidirectional wave propagation the set reduces to the conventional KP equation. The set of equations is solved numerically to obtain a solution for the Mach stem through the intersection of two obliquely incident solitary waves. It is shown that for a given range of incident angles and amplitudes of solitons, the Mach stem grows linearly in length and amplitude, reaching up to four times the amplitude of the

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incident solitary waves. Such a big growth of amplitude makes the stem wave a good candidate for the rogue waves on shallow water.

The paper is topical and interesting for a wide audience. It is well written and contains valuable results. It is a pleasure to see it published. I would only advise to make minor stylistic corrections in the section titles:

1) 2.2 From Luke's variational principle to Benney–Luke set of equations; 2) 2.3 From Benney–Luke set of equations to the Kadomtsev–Petviashvili equation.

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