

Interactive comment on “Turbulence closure:
turbulence, waves and the wave-turbulence
transition –
Part 1: vanishing mean shear” *by* H. Z. Baumert
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Reply to Anonymous Referee No. 2

Referee Topic 1.

The notion that we are presenting “*only a piece of the model suited for the case of vanishing shear*” is not entirely correct. The model as presented in our paper does indeed model the wave-turbulence transition of D’Asaro and Lien (2000b). The current paper does not address the simultaneous effects of mean shear and waves - but this is already expressed in the title of our paper.

Referee Topic 2.

We respectfully disagree with the suggestion of the Referee that the introduction is too “heavy” for the substance of the paper.

Our synthesis of mean shear- and internal wave-driven turbulence may indeed appear “elementary” in its mathematical simplicity. However, it draws on, and synthesizes, a wide, varied range of complex flow physics which may in part not be familiar to our readers. Yet the reader’s ability to fully understand and to critically judge our approach needs at least some appreciation of the physical processes involved.

i) We absolutely have to explain the non-traditional aspects of the purely mean shear-driven K-Omega two-equation closure. Our approach to wave-driven mixing depends on its simple and transparent structure.

ii) Our experience indicates that much of the turbulence closure community and possibly parts of the ocean modeling community as well are not or only vaguely familiar with the oceanographic literature on internal wave-driven mixing. Thus, we believe that we have to provide the reader with a solid background on what the term \tilde{P} entails. This term is a key element of our new model.

iii) The exciting, pioneering work of D’Asaro and Lien of Lagrangian turbulence observations is also likely unfamiliar to many readers. Our successful replication of D’Asaro and Lien’s wave-turbulence transition is not only a key part of our paper but our key argument for the merit of our new model.

The introduction has been improved in a number of details, taking care to more clearly outline what is new and what is known.

Referee Topic 3.

The turbulence model as such is a two-equation model. Together with a dynamic wave model it forms a three-equation model. However, any wave model would have no feedback from the turbulence and thus be external to the turbulence model.

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We thank the referee for his/her constructive and helpful comments.

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