

***Interactive comment on*** “Turbulence closure:  
turbulence, waves and the wave-turbulence  
transition –  
Part 1: vanishing mean shear” *by* H. Z. Baumert  
and H. Peters

H. Z. Baumert and H. Peters

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**Reply to anonymous Referee No. 1**

*Referee comment, third paragraph, first sentence, “TKE flux.”*

The reviewer is right, of course. However, the downgradient assumption for the flux of TKE in our model produces the correct structure of the neutral law of the wall (complete with correct von Kármán constant).

*Referee comment, fourth paragraph, “confusing presentation” and through the remainder of this paragraph.*

In our revision, we have quite generally strived to clarify items, taking advantage of both reviewers' notes. Specifically, the statement that there is no turbulence “for  $Ri > 1/4$ ” [really  $> 1/2$ ] appears in a chapter on laboratory conditions which we have previously characterized as lacking saturated waves. We have added words to this effect in the former line 11.

The note of the Referee as to the “two types of turbulence” is not without problems in itself. We believe that the term “resolved” carries too much of a specific notion to numerically inclined readers and might generate confusion. We are indeed modeling both mean shear- and internal wave-generated turbulence, only in different ways. The suggestion to clarify the issue up-front and in the abstract is good and has been implemented.

*Referee comment, Page 548/549,  $\Omega$  as second state variable*

Among the many choices of a second state variable  $\Omega$  is best in our view because:  $\Omega$  stays in close analogy to the r.m.s. vorticity as discussed by Wilcox (1998) whereby, under certain circumstances, vorticity is a conserved variable in the Euler equations. Only our form of the  $K - \Omega$  model reproduces the law of the wall with von Kármán constant equal to  $0.399 \approx 0.4$ , which is the international standard value.

*Referee comment, Page 549, top.*

We have dropped the reference to the vortex model.

*Referee comment, Page 549, 2nd paragraph.*

The revised text provides a lead-in to the topic of  $\tilde{P}$

*Referee comment, Page 555.*

A reference to Wilcox has been added.

We thank the Referee for her/his in-depth, constructive and helpful criticism.

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