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**Interactive
comment**

Interactive comment on "Cascade processes in rapidly rotating turbulence" *by* Maxim Reshetnyak and Oleg Pokhotelov

Anonymous Referee #1

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General comments: The authors present a theoretical study of hydrodynamical (HD) fluid turbulence under fast rotation. The discussion is focussed on the cascade processes (direct versus inverse) by using an analogue of the Fjortoft theorem. They conclude that two cascades of different directions are simultaneously present. This new result is in agreement with previous calculations made by the authors. The subject, rotating turbulence, is a widely studied subject. Several experiments have been designed to study the cascade processes, and 3D direct numerical simulations as well as analytical treatments have also been done. Here, it is proposed to use similar arguments as for 2D HD turbulence; in particular the assumption of isotropy is used. This assumption is, however, in contradiction with basic properties of rapidly rotating turbulence where strong anisotropy is observed and predicted. This property can change

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drastically the conclusion. Therefore, I do not think that this paper, as it is currently proposed, gives significant results for this problem. In conclusion, I do not recommend this paper for a publication in NPG.

Specific comments: The anisotropic character of rotating turbulence is well recognized for rotating turbulence. For example, in the limit of fast rotation (which is the subject of this paper) a weak turbulence description is possible for which a direct cascade of energy and helicity is found analytically (Galtier, PRE, 2003, 2014). This behavior was already predicted by Waleffe (PoF, 1993) and studied by Cambon et al. (JFM, 1989; 1997). All these theoretical papers are ignored by the authors whereas there are fundamental for this problem. Full credit should also be given to (recent) experiments (see e.g. the review by Godeferd & Moisy, AMR, 2015). A nonlocal inverse cascade of energy is, however, possible but it may imply a non-trivial relation with the slow mode (k//=0), which cannot be described in the present paper. This point is also discussed in the recent paper by Buzzicotti et al. (PRF, 2018). I think this contribution could be very interesting if the authors can generalize their formalism to non-isotropic turbulence.

Technical corrections: Frish, 1995 -> Frisch, 1995