Review of On dissipation time scales……., Kadantsev et al., 2023-3164

This review references detailed comments to the line(s) in the manuscript.

GENERAL

This paper, like many others in the two centuries that have elapsed since Navier first formulated equations of fluid flow and the one and a half since Stokes corrected them, stumbles on the closure problem and on the concept of dissipation. It is my contention that application of the Langevin equation to the atmosphere results in the conclusion that the emergence of fluid flow and dissipation are intimately linked at the molecular level. References [1,2,3,4] have argued so; "Direct Numerical Simulation" should really entail this approach rather than some arbitrary scale assumption.

COMMENTARY

17-18: In a coupled nonlinear system like the atmosphere, "control" is a slippery concept. Particularly when the real atmosphere's boundaries are far less restrictive than those employed here. Laminar flow of any sort is not to be found in the air, let alone such an artificial system such as Couette flow.

31: Kolmogorov's theory has been reformulated for the atmosphere; see for example [5,6].

35-41: "Closure" betrays the real difficulty. The need for a bottom up, molecular approach has been largely ignored, but was pointed out in [1,2,3].

45-50: See references [7,8,9] for a discussion of *Ri.*

60-79: The debate about dissipation ignores the reality of the Langevin equation and the approach to dissipation that emerges from a bottom up, molecular dynamics approach [4,10,11].

153 et seq: Couette flow has little physical reference to any atmospheric flow. The boundary conditions are far too restrictive. DNS is not direct. Molecular dynamics would qualify and is now almost within reach of current computational performance.

205: "dissipation time scale" is covering some major difficulties. See [4,10,11].

299-316: Dissipation is the process defining an operational temperature; it is infrared radiation to space.

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RECOMMENDATION

If the journal wishes to continue the largely unsuccessful grappling with turbulence that has characterized the last two centuries, then publish this paper - it is better than most of the genre. But if so, the authors should acknowledge, however briefly, some of the difficulties outlined above.