

Wind Energ. Sci. Discuss., referee comment RC1
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Comment on wes-2022-22

Anonymous Referee #1

Referee comment on "A New Way to Estimate Maximum Power from Wind Turbines: Linking Newtonian with Action Mechanics" by Ivan Kennedy et al., Wind Energ. Sci. Discuss., <https://doi.org/10.5194/wes-2022-22-RC1>, 2022

This manuscript contains sentences like "The air particles impact on trajectories imposing the inertia of the wind velocity on their far greater microscopic velocities, with mean free paths of the order of picometers" from which it can be judged as poorly written and lacking in a fundamental understanding of fluid mechanics. Fundamental to the subject, and to the analysis of wind and hydrokinetic turbines in particular, is the continuum hypothesis. Fluids are, effectively, infinitely divisible, and thus describable by partial differential equations. The molecular dynamics of the fluid are important only in setting the viscosity and other fluid properties. As with many fundamental issues, the continuum hypothesis is thoroughly described and justified in Batchelor (1967, Section 1.2). It follows that results such as the Betz-Joukovsky limit on power output apply equally to wind and hydrokinetic turbines despite the huge differences in the molecular structure of the two fluids. Further, any discussion of the generation of power that relies on the consideration of molecular or microscopic behaviour is pointless. In the context of conventional fluid dynamics, Equation (3) in the manuscript is irrelevant to power production and Equation (4) appears to be a crude approximation to the conventional blade element lift and drag formulations. It is not possible to comment further because no derivation of the equation is given. Equation (6) is incorrect because it equates extracted to output power and so ignores the efficiencies of the drivetrain, generator, and power electronics.

This is the first wind energy manuscript I have reviewed that mentions the philosopher Karl Popper and his ideas of falsificationism as the delineation between scientific and nonscientific knowledge. These ideas were discredited years ago – as an example of the trap of falsifiability: I make the falsifiable prediction that Vladimir Putin will die tomorrow. Is this a scientific hypothesis? No. Nevertheless, Popper would, I think, also recommend that this manuscript be rejected as it contains no testable or even tested results. In summary, the manuscript comprises an incorrect and largely irrelevant and useless analysis that makes no contribution to the scientific literature on wind turbines.

Additional Reference

G.K. Batchelor (1967), *An Introduction to Fluid Dynamics*, C.U.P.