

## Peer Review

# Review of: "The Band-Gap Approach for Turbulence and Instabilities Mitigation in Fusion Plasma"

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This paper investigates how spatial modulation in plasma affects drift wave instabilities. Mathematically, the author employs the Mathieu equation for their analysis. Due to the spatial modulation, wave numbers become broadened, and its possible effects on turbulence suppression are discussed. The author also explores whether this phenomenon could act to amplify or damp waves in actual experiments, as well as the potential for experimental application in the future.

For readers to gain a deeper understanding of this work, I believe the paper could be further developed in the following directions:

1. It would be helpful to clarify more precisely the origin of Equation (1). While it is correct that a drift wave can be described by diamagnetic drift, the current equation seems over-simplified. The paper should provide an explanation of the relative magnitudes of other physical quantities in the physical regime that justifies this simplification.
2. The authors should clarify the spatio-temporal scale of the actual plasma's spatial modulation. As you know, physical quantities such as the pressure gradient, which are tied to diamagnetic drift velocity, are key to determining the linear stability of drift wave turbulence and transport. Therefore, it is crucial to explain the regime in which both Equation (1) and the assumptions used to describe spatial modulation are valid.
3. Various possibilities for experimental application are mentioned, most of which involve electromagnetic waves and magnetic perturbations like Alfvén waves. However, there is some doubt as to whether these directly apply to phenomena concerning drift wave turbulence.

## **Declarations**

**Potential competing interests:** No potential competing interests to declare.