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Peer Review

Review of: "Detecting Turbulent Patterns in Particulate Pipe Flow by Streak Angle Visualization"

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Detecting Turbulent Patterns in Particulate Pipe Flow by Streak Angle Visualization

The paper presents a method for identifying regimes in pipe flows using low particle concentrations and a low-cost apparatus. Laminar, transitional, and turbulent flow regimes were classified based on the standard deviation of the streak angles in the image processing. Although the text is well written, the novelty and applicability of the approach are not clear; several points require further clarification in the methodology, and the discussion should be enhanced considering the pros and cons of the proposed approach.

- In the introduction, comments on the three-dimensional approaches available in many of the techniques listed in Table 1 should be included. In addition, the Spatial Filter Velocimetry (SFV) technique (Hosokawa and Tomiyama, 2012) applies low particle concentration but is not mentioned.

Reference:

Hosokawa, S., & Tomiyama, A. (2012). Spatial filter velocimetry based on time-series particle images. Experiments in Fluids, 52, 1361–1372.

- The paper aims to propose a new methodology for classifying turbulent and laminar regimes. However, the benefits and applicability of this method are not clearly outlined; please enhance the discussion.

- Several aspects of the adopted methodology require further clarification. A) The first visualization window is used for Particle Image Velocimetry (PIV) analysis, while the second window is dedicated to the new method; please describe the reasons for avoiding using the same location for the comparison. B) The laser thickness used in both conditions should be specified. C) The uncertainties associated

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with each of the variables applied in the analysis are mandatory and should be used in the discussion about the new proposed approach. D) The choice of glycerol solution should be explained, including whether the fluid properties affect particle behavior for the new method. E) An external perturbation is applied, and the Reynolds number is defined using the perturbation values of Repert = {3200, 6400}. However, in Section 5.2, the authors mention conducting repeated measurements under conditions of relatively low and high Reynolds numbers (Re = 1120 and Re = 7500). Please describe all the tested conditions in the methodology.

- The new approach utilizes particles with a Stokes number around 1. The authors state that the method "relies on the movement of the particles, not the fluid phase". As the goal is to classify the fluid regime, the influence of the particles on the flow needs further clarification. Given their high Stokes number, particles could introduce additional effects to the flow. The applicability of this method in complex flows and the impact of the particles on the results should be considered and discussed.

Declarations

Potential competing interests: No potential competing interests to declare.