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Peer Review

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

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Review of “Detecting Turbulent Patterns in Particulate Pipe Flow by Streak Angle Visualization”

This study discusses the transition of particulate pipe flow. Streak line measurement is used to measure the degree of turbulent flow. I think this paper needs revision.

Major

1. The laser light sheet is used to capture streaks of the particles. According to Fig. 2, the camera is set perpendicular to the laser sheet. Laser light reflects on the particle surface. When the light reflects on the inclined surface of the particle, the light is reflected toward the inclined direction. What light did the camera capture? When the camera captured light from the particle, the direction and the area by which the camera captured the reflected light are limited. Under these conditions, what does the image captured by the camera mean?
2. Clear descriptions of the definitions of the perturbation Reynolds number and the volumetric perturbation flow rate are necessary. How are the Re,pert = 3200 and 6400 calculated? How was the perturbation volumetric flow created?
3. The authors explain the relation between the perturbation intensity and the critical Reynolds number on p.15. Please describe the clear definition of the critical Reynolds number. I understand that below the critical Reynolds number, the pipe flow cannot be a turbulent flow, and the number does not have a relation to any turbulent intensity in its definition. Under this definition, it sounds strange that the critical Reynolds number has a relation to the intensity of perturbation. I wonder if the authors used the number of the transition Reynolds number.

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4. The authors describe that the puff did not grow over the pipe length on p.17. I think there is no difference in the flow condition in the pipe downstream of the development region. What makes a difference in the region where the puff appeared or did not appear?
5. The authors describe no difference in the friction factor from that of the laminar flow at Re = 1980. I wonder why the pressure change was not observed during the puff appearance. Distributions of pressure around Re = 2000 were observed in past studies. I recommend that the authors make more pressure measurements.

- R. W. Paterson and F. H. Abernathy, J. Fluid Mech. 51, 177–185 (1972).
- H. Hattori, et al., Phys. Fluids 34, 034115 (2022).

1. The authors describe that Image 6(b) captures a turbulent puff on p.20. At the same time, St is almost 1 on p.20, and they describe that the particles do not follow the fluid trajectory. I think Image 6(b) can capture another phenomenon from that of the puff of fluid.
2. This paper discusses the effect of the perturbation Reynolds number and the transition Reynolds number. I think the objective of this study is to examine the transition of particulate pipe flow. The authors discuss the effect of the particles in flow on the transition Reynolds number, using the present result from the streak line angle distribution. The mechanism on the difference/identity between the two flows should also be discussed.

Minor

1. Fig. 6 appears before Fig. 5 in the text. Please correct the figure numbers and places.
2. How many data points are used for Fig. 1? Probability is plotted. Is the data number sufficient for statistical data processing?
3. Fig. 7 shows the time history of the standard deviation. Many data points will be required to calculate the deviation. How many data points are captured at the moment of the line in Fig. 7?
4. How is the value of the red line defined? I think the authors use it as the boundary between the laminar and turbulent flow.

Declarations

Potential competing interests: No potential competing interests to declare.