

***Interactive comment on* “Spatial distribution of tracers for optical sensing of stream surface flow” by Alonso Pizarro et al.**

Anonymous Referee #3

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This manuscript deals with the image velocimetry method and suggests a new metric to evaluate the seeding quality. The study is interesting, but there are some issues that need to be addressed.

- There are some vague sentences.
- At some points, the text lacks the necessary details to fully comprehend the steps followed. For example, the authors do not provide any information on how the motion of the particles of the synthetic images was simulated. Similarly, the concept behind some assumptions is not explained (see below the comment about "multiplication of power laws" and the comment about $v=D$).
- The value of the suggested index is not fully demonstrated. The authors need to show

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what would be the error if all frames were used instead of selecting frames based on the suggested index.

- The well known constant π is used as a symbol for the suggested metric. This is like using number 1 as a symbol for a variable or index.

The specific locations in the manuscript of the previous general comments are given below.

Location: "A descriptor of the seeding characteristics (based on density and aggregation) was introduced based on a newly developed metric π ." Comment: In mathematics, the Greek letter π is reserved to be used for one and only one thing, the ratio of a circle's circumference to its diameter. Please use another symbol (e.g., "SCD").

Location: "A reduction of image-velocimetry errors was systematically observed by decreasing the values of π " Comment: Since this is a metric, not a parameter that can be directly adjusted, it would be better to write "A reduction of image-velocimetry errors was systematically observed with lower values of SCD"

Location: Equation 1 Comment: It looks like S is missing after the exp(1).

Location: "The range of variability was established based on the ..." Comment: Does this refer to the values of the previous sentence?

Location: "Furthermore, each numerical experiment contains 20 images, ..." Comment: How these 20 images were created?

Location: "ðĪJŘ ranges from 0.5 to 200 (12 different values) ..." Comment: It is very unusual to start a sentence with a lowercase variable.

Location: Lines 163-175 Comment: These lines should be broken into two paragraphs, one for PTV and one for PIV.

Location: "The theoretical velocity was set at 15 px/frame ..." Comment: This term ("theoretical velocity") is repeated many times in the manuscript, but its meaning has

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not been defined.

Location: "... used 8 and 20 (px) " Comment: The unit px appears both inside parenthesis and without parenthesis (preferable) in the text.

Location: "PTV used 8 and 20 (px) for detection and tracking, respectively. PIV used FFT with three-passes (128x64, 64x32, 32x16)." Comment: This information has been already given (and more clearly) previously. It would be better to remove these sentences.

Location: "where f = function" Comment: This is not a solid definition, neither from a linguistic nor from a mathematical point of view. c Location: "The function f is usually considered as a multiplication of power laws." Comment: A reference is required.

Location: "rhocv1 values for PIV and PTV were taken from Figure 4 and are 1.52E-03 and 1.02E-03, " Comment: The error, for low error values, is not very sensitive on the suggested metric. What if a single ' $v=1$ converging seeding density' was used for both PTV and PIV? This would reduce the number of parameters.

Location: "the empirical aggregation level (i.e., the empirical one equivalent to the used in the numerical simulations), was quantified through the dispersion index D ." Comment: This approach, which assumes D as an estimator of v , needs to be justified and explained with more details.

Location: "A moving window of 100 frames was arbitrarily chosen, " Comment: What exactly was chosen arbitrarily, the length of the window?

Location: "Figure 8.A shows the particular case of PTV; nevertheless, PIV presented similar results. The locations of the minimum and maximum π values was, therefore, unaffected by the image-velocimetry technique under consideration." Comment: Why PTV and PIV would present different values for the suggested index? Is it because of the different rhocv1 used for each method? If so, then this (the fact that PIV and PTV presented similar results) is an indication of using a single rhocv1 value for both

methods (see previous comment).

Location: Table 2 Comment: What would be the error if all frames were used?

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