Review of: "Tsallis Entropy applied to microfluidic channels analysis"

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Potential competing interests: No potential competing interests to declare.

Strengths:

- The topic of using Tsallis entropy to analyze fluid flow in microchannels is novel and interesting. Applying concepts from thermodynamics and information theory to microfluidics could provide new insights.

- The article clearly explains the relevant background concepts like Tsallis entropy, Shannon entropy, and the principle of maximum entropy. The derivation of the velocity distribution function is presented in detail.

- The computational fluid dynamics simulations provide a good set of test cases to validate the proposed analytical model based on Tsallis entropy. The comparison between simulation and model iswell illustrated.

- The writing is clear and understandable overall. The figures help visualize the concepts effectively.

Weaknesses:

- The introduction could be expanded to provide more motivation and background on prior work at the intersection of microfluidics and information theory/thermodynamics.

- While model equations are presented, the process of determining the α and ζ parameters is described qualitatively. More details on the parameter optimization approach could be provided.

- Only simple rectangular microchannel geometries are considered. Testing on more complex designs would strengthen the results.

- There is limited discussion of the broader implications of the work - how it could impact microfluidic analysis and design going forward.

Suggestions:

- Provide more background on prior applications of entropy concepts in microfluidics in the introduction.

- Include details on the numerical optimization process used to determine the model parameters α1, α2, ζ1, ζ2.

- Show results for microchannels with more complex geometries beyond simple rectangles.

- Elaborate on the significance of the work in the conclusion - discuss how it could aid microfluidic system analysis and design.

- Perform deeper analysis relating the model parameters to specific microchannel features to build predictive capability.