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

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Potential competing interests: No potential competing interests to declare.

The author proposes to describe the fluid flow in microchannels, a context where turbulence and other interesting non-equilibrium phenomena are expected, using the Tsallis formalism of non-extensive statistical mechanics. The motivation is interesting in itself, however, there are some imprecisions in the current version of the article that I believe should be made clear.

First of all, there is a widespread misconception (not only in this present article but in the literature in general) of equating the q-exponential family of distributions, which is what the author employs as statistical model, with the formalism that maximizes Tsallis entropy, namely what has been called “non-extensive” statistics. Maximization of Tsallis entropy is only one mechanism that leads to the q-exponential family, and moreover it has been questioned in terms of its internal consistency. Other frameworks, such as superstatistics (Beck & Cohen, Physica A 322, 267 [2003]) are arguably more elegant and do not require the generalization of the Boltzmann-Gibbs entropy, being based simply on the correct application of the product and sum rules of probability theory. The main point about this distinction is that, finding q-exponentials in Nature does not imply that such phenomena are non-extensive, chaotic, fractal or that Tsallis entropy is more relevant to them than Boltzmann-Gibbs entropy.

On the other hand, the maximization of the Tsallis entropy depicted here is not the one typically used in the field, as it does not employ the so-called escort distributions. This is, however, only a minor change, that would turn the exponent 1/(q-1) of Eq. (5) into 1/(1-q). It would be desirable that, in the results, the values of the “entropic index” q obtained were highlighted in order for the reader to assess the departure from q=1.