Title of the article: "Spherulites: How do they emerge at an onset of 2 nonequilibrium kinetic-thermodynamic and structural singularity addressing conditions?"

Summary:

This communication addresses the question of the far-from-equilibrium growth of spherulites with different growing modes. Specifically, the authors investigate the emergence factors of the two different evolution types of spherulitic growth modes, namely diffusion-controlled growth and convection-controlled growth. The authors present a model based on mass-convection with dimensionless parameters and derive a critical value of the diffusional growth radius. Through dimension analysis, the authors also derive a limit for the non-diffusion growth radius and relate it to the entropy production in both Mullins-Sekerka and Goldenfeld modes.

Comments:

Scientifically speaking, the article presents an interesting take from the authors on the mechanisms of spherulite growth. I strongly agree with the authors that the spherulitic growth suggests underlying out-of-equilibrium dynamics and, as such, should be studied in the framework of far-from-equilibrium thermodynamics. However, I am not sure to understand what motivates the authors to assume that the growth dynamics are governed by convection. A quick explanation in the introduction on how convection occurs in spherulitic growth would be greatly appreciated.

The manuscript contains all expected components (Introduction, Model, Results and Analysis, Conclusion) and is well-developed. The literature is relevant to the subject. Unfortunately, I cannot say that the article is well-written, as I had trouble understanding a lot of sentences. I strongly recommend the authors to shorten and simplify sentences and avoid convoluted explanations. Although it can remain as it is, I also find quite confusing the choice of the letters for the variables in the equations.

Specific comments:

Line (42): *"they change their growing mode toward its wave-like (long times) counterpart, $r \sim t$."* What does "wave-like" mean in this context? I guess that it refers to convection. "Convection-like" would be a better suited terminology.

Line (72): *"is twice so small" "*is half the size"

Line (94): *"external concentration field"*

Line (101) and other lines: "depends on"

Line (124) *"at the interface/surface"* simply change it to "at the surface"

Line (129) "*the surface is far from equilibrium and its deviation from equilibrium is proportional to …"*

Eq. (24) I don't see how the authors got this result. Please, add some explanations.

Line (204) *"suggests that though the model is deterministic, or of the "mean-field" type"* this is not what mean-field means. Mean-field is not a synonym of deterministic, it refers to a method of smoothening a stochastic field, which is not the case here. I recommend erasing this part.

Line (252): *"it seems to us that the non-dimensionality of the proposed modeling suggests that the system does not depend upon experimental details, manifesting somehow a quasi-universal character of the performed modeling"* I don't understand the relation between the fact that a model is dimensionless and the details of an experimental setup. The fact that a model is dimensionless only suggests that the results of an experiment will not depend on the scale of that experiment (but it will depend on other factors). The universal character of the modelling only applies to the scaling of the system.