

Interactive comment on “Constructal theory of pattern formation” by A. Bejan

Anonymous Referee #5

Received and published: 20 July 2006

This manuscript describes ongoing research about the “Constructal Theory” and gives an example of how it might be applied in a catchment setting (in Section 5). I had a few comments, mostly minor, that the author will be able to easily address.

Comments

1. p. 1, 7 lines from bottom. Missing word. Replace “are wedge-shape . . .” By “are the wedge-shape . . .”.
2. p. 3, 3rd para. Sentence starting with “No configuration to become a particular image”. I did not understand what was meant by this sentence? Perhaps rephrase the sentence?
3. p. 4, 4 lines down. Is “. . . equilibrium flow architecture . . .” the correct meaning here? The discussion on the previous page refers to the equilibrium of the second

- law but that is not what is meant here. Perhaps a more useful distinction would be to contrast the “dead state” – a more graphic description of classical (2^{nd} law) equilibrium – with the flow architectures being discussed here which are definitely not in a “dead state”.
4. p. 5, last sentence of 2^{nd} para., sentence starting “If the larger system the fastest.”. This sentence does not convey (to me) the intended meaning. I assume “the larger system” referred to includes the duct and two reservoirs at either end. That is not how the sentence reads – perhaps rephrase it.
 5. p. 6, 9 lines from top. Missing word? To fix, replace “. . . does evolve into a flat jet.” with “. . . does **not** evolve into a flat jet.”
 6. p. 6, Eqn 1. ν (in Eqn 1) has not been defined. It appears that in many places, ν and V have the same meaning?
 7. p. 7, p^2 Po/A. It would help readers follow the logic if the p^2 Po/A term was given in exactly the same format throughout, e.g. $Po p^2 / A$ is used in Eqn 1 but not in the text or table on p. 7. Also, please define Po (bottom of p. 6).
 8. p. 10, 6 lines from top. Typo. Replace “. . . against the tie arrow . . .” with “. . . against the **time** arrow . . .”.
 9. p. 10, 4 lines from bottom. Hydrologists (and Ecologists) might get the wrong message from the “diffusion (an invisible, disorganized flow)” statement because the diffusion would be down a concentration gradient that is not necessarily totally “disorganized”. Can another phrase be found?
 10. p. 11, 1^{st} para. Sentence starting “Those who model miss half of the drawing.”. This is an excellent and very powerful point ! Also see point 17 below – perhaps this one could also be moved into the introduction as well!

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11. p. 11, 4 lines from bottom. Hydrologists (and Ecologists) might get the wrong message by setting the depth scale to have the same symbol, D_0 . Why not use a separate symbol for depth, say Z , and then note that in the analysis here, $Z \sim D_0$. I think this will help readers understand the logic.
12. p. 12. The derivation of Eqn 2 and the subsequent jump to Eqn 3 is too quick (for typical readers, e.g. Hydrologists, Ecologists, etc.). Maybe use some intermediate steps. Also, please define u (given in the equation defining P_x just prior to Eqn 2). Also, there is a typo in the sentence between Eqns 2 and 3, i.e. “o” should be “of”.
13. p. 14, 3 lines from top. “. . . through the sink.” Is sink the correct word? Perhaps outlet?
14. p. 14, last line. “. . . imposed mass flow rate (M).” I found this a little confusing and had to reread to understand. M is the dimensionless number defined to be proportional to flow rate. Perhaps reword this sentence to make that clear for readers.
15. p. 18, 5 lines down. The sentence “This characteristic in the field of river morphology.” It would be useful for readers if a reference were added after the above sentence.
16. Section 6. Is Section 6 necessary for the purposes of this article? To a reader, all the previous sections build on one another. However, I found Section 6 to be a big jump. Something for the author to think about.
17. p. 23, last 2 lines. The sentence “The “boundary conditions” that we assume routinely”. Excellent – a very powerful point. Perhaps this needs to be in the introduction. It could be added there quite easily! Also see point 10 above. The combination of these two points really sets out the idea of constructal theory in a very practical way.

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Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 3, 1773, 2006.

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3, S493–S496, 2006

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