Stellingen

behorende bij het proefschrift

Travelling Waves on Trees and Square Lattices

van

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1. The fact that the governing equation for the phase evolution of travelling waves on $\mathbb{Z}^2$ includes a direction-dependant drift term shows that the long-term behavior of expanding fronts on lattice domains must be carefully examined and not naively generalized from the continuous setting.

   [Chapters 2 & 3]

2. In the continuous case, the approximating equation for the interface of the solutions to the Allen-Cahn equation can be reduced to the heat equation, for which we have the exact solution and tools such as the comparison principle. In the discrete case, the approximating equation reduces to the linear LDE, which, contrary to the continuous heat equation, may allow negative terms and, as such, experiences richer behavior than its continuous counterpart.

   [Chapters 2 & 3]

3. The comparison principle remains a powerful tool in the world of differential equations. It allows us to examine and study complex structures by reducing them to simpler objects.

   [Chapters 2, 3 & 4]

4. The most exciting phenomenon concerning waves on k-ary trees is that an increase in the diffusion strength drives the change of the wave direction. More precisely, for each detuning parameter close to 1, the wave experiences the following changes in speed as we increase the diffusion d from 0 to $+\infty$:

$$\text{pinning } (c = 0) \rightarrow \text{spreading } (c > 0) \rightarrow$$
$$\text{pinning } (c = 0) \rightarrow \text{retreating } (c < 0).$$

   [Chapter 4]

5. It is time that the community abandoned the stereotypical and outdated division of mathematics research into 'pure' and 'applied'. This division might imply that applied mathematics is not pure and that pure mathematics is not applied. However, a lot of the results from the

traditional fields of pure mathematics are very much applied. Moreover, most research in applied mathematics is conducted PUREly out of mathematical curiosity and without concrete applications in mind.

6. Every author should think carefully before using terms such as 'trivial', 'trivially satisfied', or 'it is easy to see'. What is trivial to one might not be trivial to someone else.

7. When imposing new and unexplored assumptions on their models, every mathematician should ask themselves: 'how realistic is this assumption in the context of the model?' To paraphrase Captain K. Janeway: *In mathematics, with right mathematical assumptions, one can justify almost any claim. That is its power and its flaw.*

8. Mathematics is often perceived as a purely technical field. However, mathematics might be the most creative field that exists. To be a mathematician, one must be able to envision and imagine structures that do not yet exist in their tangible forms. If that is not art, what is? What is a mathematician, if not an artist?