Traveling waves for advection-reaction-diffusion equations with negative diffusivity

Andrea Corli
University of Ferrara
crl@unife.it
Diego Berti
University of Modena and Reggio Emilia
diego.berti@unimore.it
Luisa Malaguti
University of Modena and Reggio Emilia
luisa.malaguti@unimore.it

In the talk I shall present some recent results, motivated by the modeling of collective movements, about traveling-wave solutions for advection-reaction-diffusion equations

$$u_t + f(u)_x = (D(u)u_x)_x + g(u),$$

with $g(0) = g(1) = 0$ and $u \in [0, 1]$. The main issue is that the diffusivity D, that may vanish at 0 or 1, can be *negative*. More precisely, we first deal with the case when $g > 0$ in $(0, 1)$ and D changes sign once, either from the positive to the negative or conversely. These results are extended to a finite number of sign changes of D. Then, we also admit the source term g to change sign.

In every case, the presence of the convective term f leads to new behaviors of the profiles with respect to the pure reaction-diffusion case.

References

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