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Long-time behaviour of hybrid finite volume schemes for anisotropic Drift-Diffusion model

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In this poster, we present a Hybrid Finite Volumes scheme to discretise semiconductors models. This type of finite volumes scheme [1] is devised to handle general polygonal/polyhedral meshes, alongside with anisotropic diffusion tensors. Especially, the scheme introduced here can be used in situations where the semiconductor is immersed in a magnetic field [2].
The scheme is based on the nonlinear discretisation introduced in [3], and its analysis relies on the preservation of a discrete entropy structure, which mimics the continuous behaviour of the system. Especially, the scheme is asymptotic preserving in long-time.
Numerical experiments will highlight the main properties of the scheme.
Work in collaboration with Claire Chainais-Hillairet, Maxime Herda and Simon Lemaire.

[1] R. Eymard, T. Gallouët, and R. Herbin, Discretization of heterogeneous and anisotropic diffusion problems on general nonconforming meshes. SUSHI: a scheme using stabilization and hybrid interfaces, IMA J. Numer. Anal. 30 (2010), 1009–1043.
[2] H. Gajewski, and K. Gärtner, On the Discretization of van Roosbroeck's Equations with Magnetic Field, ZAMM - Journal of Applied Mathematics and Mechanics 11 (1995), 247–264.
[3] C. Chainais-Hillairet, M. Herda, S. Lemaire, and J. Moatti, Long-time behaviour of hybrid finite volume schemes for advection-diffusion equations: linear and nonlinear approaches, Submitted for publication

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