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Numerical analysis of DDFV schemes for semiconductors energy-transport models.

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The energy transport system, [2,3], is composed by two continuity equations (one for the density of electrons, one for the density of internal energy), coupled with a Poisson equation for the electric potential; the two densities depend non-linearly on the unknowns, the chemical potential and the temperature. The key point of the model, presented in
[2], is a change of variables which allows to pass to entropic variables. Thanks to this, it is possible to prove an entropy estimate which gives an a priori estimate on the problem (which leads to the study of regularity and long time behavior of the solution).
We propose, as an extension to some previous works (e.g. [1]), a Discrete Duality Finite Volume scheme (DDFV for short) for the energy transport system; we reproduce at a discrete level the strategy proposed in [2], by proving, as in the continuous case, a discrete entropy-dissipation estimate. We validate our theoretical results with some numerical tests (see [4,5]).

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