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Analysis of Integrate and Fire models

We will discuss some properties of the solutions of a Fokker-Planck equation for an integrate and fire neuron model. We are able to give situations in which no, one or two stationary solutions are allowed. Blow-up of solutions is allowed in this model if the density is extremely concentrated onto the firing voltage. The linear case is completely understood by general relative entropy methods. Extensions and further ongoing directions will be discussed. This is a work in collaboration with B. Perthame and M.J. Cáceres.