Parabolic equations on graphs with nonlinear boundary conditions

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We consider a linear heat equation on a network equipped with a general nonlinear boundary condition. After transforming it into a vector-valued partial differential equation on an interval with a coupled boundary condition, it is possible to discuss the original problem by means of gradient system techniques. We obtain global well-posedness and relevant qualitative properties of the solution to the system in dependence of properties of the nonlinear functions appearing in the boundary conditions. Our results generalize the case of a diffusion equation with nonlinear Robin boundary condition for an individual interval.

This is joint work with R. Pröpper.