# A finite element method for elliptic equations on moving surfaces

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In this talk a new finite element approach for the discretization of elliptic partial differential equations on surfaces is treated. The main idea is to use finite element spaces that are induced by triangulations of an "outer" domain $\Omega \subset \mathbb{R}^3$ to discretize the partial differential equation on the hypersurface $\Gamma \Subset \Omega$. The method is particularly suitable for problems in which there is a coupling of a problem in the outer domain with the equation on $\Gamma$ and $\Gamma$ may vary in time. This happens, for example, in multiphase fluids models if one takes so-called surface active agents (surfactants) into account. These surfactants induce tangential surface tension forces and thus cause Marangoni phenomena. We give an analysis that shows that the method has optimal order of convergence both in the $H^1$ and in the $L^2$-norm. We also discuss numerical properties of the corresponding linear algebraic systems. Results of numerical experiments are included to illustrate the analysis. This presentation is based on the joint research with Arnold Reusken and Jörg Grande from RWTH Aachen.