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Electrorheological fluids, an example for systems with non-standard growth

Electrorheological fluids change dramatically their mechanical properties in dependence on an applied electrical field. The elliptic or parabolic system of PDE's, which describes this phenomenon, possesses so called non-standard growth conditions. We discuss the underlying structure of this system, which naturally leads to generalized Sobolev spaces $W^{1,p(x)}(\Omega)$ and present first existence, uniqueness and regularity results.

Reference: M. Růžička, Electrorheological Fluids: Mathematical Modelling and Existence Theory, *Habilitationsschrift Universität Bonn*