Title of the talk: On the prescribed Jacobian inequality $\det \nabla \varphi \geq f$ in Sobolev spaces in the plane.

Abstract: I will speak about the prescribed Jacobian inequality coupled with a Dirichlet condition, namely

$$\begin{cases} \det \nabla \phi \geq f & \text{a.e. in } \Omega \\ \phi = \mathrm{id} & \text{on } \partial\Omega \end{cases} \tag{1}$$

where $\Omega \subset \mathbb{R}^2$ is a bounded smooth connected open set, $f : \Omega \to \mathbb{R}$ and where $\phi : \Omega \to \mathbb{R}^2$ is the unknown. I will prove that for every $1 < p \leq \infty$ and every $f \in L^p(\Omega; [0, \infty))$ with $\int_\Omega f < |\Omega|$ there exists a bi-Sobolev solution ϕ of (1); more precisely, for every $\epsilon > 0$, there exists an homeomorphism $\phi : \overline{\Omega} \to \overline{\Omega}$ with

$$\phi, \phi^{-1} \in W^{1,(p+1)/2-\epsilon}(\Omega; \Omega).$$

I will also give an application to a model problem in nonlinear elasticity. This is a joint work with Julian Fischer.