Title: A variational problem involving a polyconvex integrand.

Abstract: Let $f \in C^1(\mathbb{R}^d)$ and $h \in C^2(0, \infty)$ be strictly convex functions. When $\lim_{t \to 0^+} h(t) = \lim_{t \to \infty} h(t)/t = \infty$, the current state of the art in the calculus of variations dramatically fails to provide the Euler–Lagrange equations for the minimizers of

$$(u, \beta) \to I_S(u, \beta) = \int_\Omega [f(\nabla_S u) + h(\beta)] \, dx$$

over $\mathcal{A}$, the set of pairs $(u, \beta)$ such that $u \in W^{1,p}(\Omega, \Omega^*)$, $\beta > 0$ and $u\#\beta = \chi_{\Omega^*}$. Here, $\nabla_S u$ is the $f$–projection of $\nabla u$. When $\mathcal{S}$ is a finite dimensional space, we prove uniqueness of a minimizer of $I_S$ over $\mathcal{A}$, and identify its Euler–Lagrange equation. An approximation argument allows us to make an inference about the case when $\mathcal{S}$ is an infinite dimensional space.