On the l_p-norm estimation in a quasilinear regression model

The talk will be based on my recently submitted manuscript on the l_p-norm ($1 \le p < \infty$) estimation of the parameters in a quasilinear regression model of the form

$$g(t;\boldsymbol{\alpha}) = \varphi(f_0(t) + \alpha_1 f_1(t) + \cdots + \alpha_n f_n(t)),$$

where $\boldsymbol{\alpha} = (\alpha_1, \ldots, \alpha_n)^T \in \mathbb{R}^n$ is an unknown vector parameter, $f_0, f_1, \ldots, f_n$ are arbitrary fixed functions, and the function $\varphi : I \to \mathbb{R}$, with $I \subseteq \mathbb{R}$ being an interval (open, closed, half-open, bounded or unbounded), is continuous and strictly monotonic.

Many important model functions which often appear in applied research are quasilinear or can be parameterized as a quasilinear model. For example: When $\varphi(u) = \exp(u)$, we have exponential regression; when $\varphi(u) = u^a$, where $a \neq 0$ is given, we have power regression; when $\varphi(u) = 1/u$, we have hyperbolic regression.

The focus of this talk will be on the existence of the best l_p-norm estimator in a quasilinear regression model of the above form. I will review what is known about this problem and then present a theorem which guarantees the existence of the best l_p-norm estimator. From that theorem, which both extends and generalizes the previously known existence result, the existence of the best l_p-norm estimator for the whole class of nonlinear model functions follows immediately.