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Dongming Wei (dwei@math.uno.edu), Department of Mathematics, University of New Orleans, New Orleans, LA 70148. *Penalty Approximations to Incompressible Power-Law Flows*. Preliminary report.

In this report, we show progress made as well as difficulties met in studying penalty approximations to the power-law instationary Navier-Stokes equation:

$$\frac{\partial \mathbf{u}}{\partial t} + Re(\mathbf{u} \cdot \nabla) \mathbf{u} - \nabla \cdot (|\nabla \mathbf{u}|^{r-2} \nabla \mathbf{u}) + \nabla p = \mathbf{f},$$

in bounded convex domains $\Omega \subset R^d$, where $2 \leq d$ and $1 < r < \infty$. We will be concerned with existence, regularity of solutions as well as convergence, error estimates in the approximations. (Received October 02, 2000)