SEMINÁRIO DE ANÁLISE

Electrostatic Born-Infeld theory

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31/03/17
10:10 Horas

Auditório do MAT

Abstract.

We discuss existence, uniqueness and regularity of the solution of

$$\begin{cases} -\operatorname{div}\left(\dfrac{\nabla\phi}{\sqrt{1-|\nabla\phi|^2}}\right) = \rho, & x \in \mathbb{R}^N, \\ \lim_{|x|\to\infty} \phi(x) = 0. \end{cases} \tag{$\mathcal{BI}$}$$

The equation in $(\mathcal{BI})$ appears for instance in the Born-Infeld nonlinear electromagnetic theory: in the electrostatic case it corresponds to the Gauss law in the classical Maxwell theory and so ϕ is the electric potential and ρ is an assigned extended charge density.