SEMINÁRIO DE EQUAÇÕES DIFERENCIAIS

On the Cauchy problem for a Boussinesq type system

MAHENDRA PANTHEE

IMECC - Universidade Estadual de Campinas

16/10/2012 (Terça-Feira)

16:00 horas

Sala 321 do IMECC

Resumo: We consider the initial value problem (IVP) associated to a Boussinesq type system

$$\begin{cases} \eta_t + \Delta\Phi - \frac{\mu}{6}\Delta^2\Phi = -\epsilon\nabla\cdot\left[\eta\big((\partial_{x_1}\Phi)^p, (\partial_{x_2}\Phi)^p\big)\right], \\ \Phi_t + \eta - \mu(\sigma - 1/2)\Delta\eta = -\frac{\epsilon}{p+1}\big((\partial_{x_1}\Phi)^{p+1} + (\partial_{x_2}\Phi)^{p+1}\big), \end{cases}$$

for $(t,x) = (t,x_1,x_2) \in \mathbb{R}^{1+2}$, where ϵ is the amplitude parameter, μ is the long-wave parameter and σ is the Bond number. First we diagonalize the system and differentiate the resulting equations with respect to each of the spatial variables to obtain a new larger system, for the first order derivatives of the solutions. We prove that this new system is locally well-posed in $(H^s(\mathbb{R}^2))^4$, $s > 3/2$ and consequently obtain the local well-posedness result for the original system in $H^s \times \mathcal{V}^{s+1}$ for $s > 3/2$, where $H^s(\mathbb{R}^2)$ is the usual L^2-based Sobolev space and $\mathcal{V}^s(\mathbb{R}^2)$ is the Hilbert space defined by $\mathcal{V}^s(\mathbb{R}^2) := \big\{f \in \mathcal{S}'(\mathbb{R}^2) : \sqrt{-\Delta}f \in H^{s-1}\big\}$, with the corresponding norm $\|f\|_{\mathcal{V}^s(\mathbb{R}^2)} = \|\sqrt{-\Delta}f\|_{H^{s-1}(\mathbb{R}^2)}$. Joint work with Felipe Linares and Jorge Drumond Silva.