On weak solutions of a Stokes-Magneto system with fractional diffusions

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We study a Stokes-Magneto system in $\mathbb{R}^d$ ($d \geq 2$) with fractional diffusions $\Lambda^{2\alpha}\mathbf{u}$ and $\Lambda^{2\beta}\mathbf{b}$ for the velocity $\mathbf{u}$ and the magnetic field $\mathbf{b}$, respectively. Here α, β are positive constants and $\Lambda^s = (-\Delta)^{s/2}$ is the fractional Laplacian of order $s \in \mathbb{R}$. Global existence and uniqueness of weak solutions will be shown for initial data in $L_2(\mathbb{R}^d)$ when α and β satisfy some conditions. This talk is based on a joint work with Hyunwoo Kwon at the Department of Appliled Mathematics, Brown University.