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Div - curl estimates with critical power weights

Yohei Tsutsui
Shinshu University

Abstract: The purpose of this talk is to consider critical estimates of the non-linear term $(u \cdot \nabla)v$, like

$$\|(u \cdot \nabla)v\|_Y \lesssim \|u\|_{L^\infty} \|\nabla v\|_X,$$

with weighted Hardy spaces X and Y. Critical weights, we will treat, are related to the optimal L^2-decay rate $(n+2)/4$ for the incompressible Navier-Stokes equations on the whole space $\mathbb{R}^n$. Such rate was showed by Wiegner, and then the sharpness was proved by Miyakawa & Schonbek. Main tools for the proof of our result are Bogovski's formula for the divergence equation and a restricted weak type vector-valued inequality for the Hardy-Littlewood maximal operator.