

On the regularity criteria for liquid crystal flows involving the gradient of one velocity component

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May 11, 2020

Abstract

In this paper, we show a regularity criteria for three dimensional nematic liquid crystal flows. More precisely, we prove that the strong solution (u, d) can be extended beyond T , provided $\|\nabla u\|_{L^p(0, T; L^q(\mathbb{R}^3))} \leq \frac{2}{p} + \frac{3}{q} \leq \frac{19}{12} + \frac{1}{2q} (\frac{30}{19})^3$ with some conditions about the orientation field $\|\nabla_d h\|_{L^\alpha(0, T; L^\beta(\mathbb{R}^3))} \leq \frac{2}{\alpha} + \frac{3}{\beta} \leq \frac{3}{4} + \frac{1}{2\beta}$.

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