Mathematics > Analysis of PDEs

A lower bound on blowup rates for the 3D incompressible Euler equation and a single exponential Beale-Kato-Majda type estimate

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We prove a Beale-Kato-Majda type criterion for the loss of regularity for solutions of the incompressible Euler equations in $H^{s}(\R^3)$, for $s>\frac52$. Instead of double exponential estimates of Beale-Kato-Majda type, we obtain a single exponential bound on $\|u(t)\|_{H^s}$ involving the length parameter introduced by P. Constantin in \cite{co1}. In particular, we derive lower bounds on the blowup rate of such solutions.

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