

**INFINITE ENERGY SOLUTIONS FOR DAMPED
NAVIER-STOKES EQUATIONS IN \mathbb{R}^2**

SERGEY ZELIK

UNIVERSITY OF SURREY

ABSTRACT. The damped Navier-Stokes equations in the whole 2D space will be discussed. The global well-posedness, dissipativity and further regularity of weak solutions of this problem in the uniformly-local spaces will be verified based on the further development of the weighted energy theory for the Navier-Stokes type problems. Note that any divergent free vector field $u_0 \in L^\infty(\mathbb{R}^2)$ is allowed and no assumptions on the spatial decay of solutions as $|x| \rightarrow \infty$ are posed.

In addition, applying the developed theory to the case of the classical Navier-Stokes problem in \mathbb{R}^2 , we show that the properly defined weak solution can grow at most polynomially (as a quintic polynomial) as time goes to infinity.