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ROBUST ERROR ESTIMATES IN WEAK NORMS WITH APPLICATION TO IMPLICIT LARGE EDDY SIMULATION

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Abstract. In this talk we will discuss a posteriori and a priori error estimates of filtered quantities for solutions to some equations of fluid mechanics. For the computation of the solution we use low order finite element methods using either linear or nonlinear stabilization. In reference [1], we introduced a class of weak norms corresponding to taking a weighted H^1-norm of a filtered solution. For these weak norms we proved error estimates for the Burgers' equation whose error constants depend only on the regularity of the initial data. In particular the estimates are independent of the Reynolds number, the Sobolev norm of the exact solution at time $t > 0$, or nonlinear effects such as shock formation. It follows that we obtain a complete assessment of the computability of the solution given the initial data. After a detailed description of the analysis in the case of the Burgers' equation we widen the scope and discuss two dimensional incompressible turbulence and passive transport with rough data within the same paradigm.

REFERENCES

[1] Burman, E. *Computability of filtered quantities for the Burgers' equation.* arXiv:1111.1182. (2012).