

# Headway in Large-Eddy-Simulation within the SPH models

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## ABSTRACT

In the present paper we show some preliminary results of a novel LES-SPH scheme that extends and generalizes the approach described in [1]. Differently from that work, the proposed scheme is based on the definition of a Quasi-Lagrangian Large-Eddy-Simulation model where a small velocity deviation is added to the actual fluid velocity. When the LES equations are rearranged in the SPH framework, the velocity deviation is modelled through the Particle Shifting Technique (PST), similarly to the  $\delta$ plus-SPH scheme derived in [2]. The use of the PST allows for regular particle distributions, reducing the numerical errors in the evaluation of the spatial differential operators. As a preliminary study of the proposed model, we consider the evolution of freely decaying turbulence in 2D. In particular we show that the present scheme predicts the correct tendencies for the direct and inverse energy cascades.

## REFERENCES

- [1] Di Mascio A., Antuono M., Colagrossi A., and Marrone S., Smoothed particle hydrodynamics method from a large eddy simulation perspective. *Physics of Fluids*, (2017) **29**(035102).
- [2] Sun P. N., Colagrossi A., Marrone S., Antuono M., and Zhang A. M., A consistent approach to particle shifting in the  $\delta$ -Plus-SPH model. *Computer Methods in Applied Mechanics and Engineering*, (2019) **348**:912–934.