An unconditionally stable Navier-Stokes solver on Octrees
MAXIME THEILLARD, UCSD, ARTHUR GUITTET COLLABORATION,
FREDERIC GIBOU COLLABORATION — We present a numerical method for
solving the incompressible Navier-Stokes equations on non-graded quadtree and oc-
tree meshes and arbitrary geometries. The viscosity is treated implicitly through
a finite volume approach based on Voronoi partitions, while the convective term is
discretized with a semi-Lagrangian scheme, thus relaxing the restrictions on the time
step. A novel stable implementation of the projection step is introduced, making use
of the Marker And Cell layout for the data. The solver is validated numerically in
two and three spatial dimensions and challenging numerical examles are presented
to illustrate its capabilities.