Title: **A simple high-resolution advection scheme**

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The authors present a simple and robust, second-order in space and time, numerical scheme for the linear advection equation:

$$\frac{\partial c}{\partial t} + \frac{\partial (cu)}{\partial x} + \frac{\partial (cv)}{\partial y} + \frac{\partial (cw)}{\partial z} = 0 \tag{1}$$

The scheme uses MUSCL interpolation[1] together with a Runge-Kutta predictor corrector sequence.

The scheme is applied to a finite volume formulation of the governing equation and then particularized to a structured two-dimensional grid of quadrilaterals. The method however, can be applied to multi-dimensional structured or unstructured finite volume meshes.

Numerical examples in one and two dimensions are presented and compared to several classical schemes and to one proposed by Bott[2]. The accuracy of the scheme is very close to the latter, even for non-uniform grids. The numerical examples demonstrate that this simple method afford good resolution of high and low spatial gradients and is also able to capture the peaks without excessive numerical dissipation or dispersion.

References:

1. http://www.crs4.it/HTML/int_book/NumericalMethods/subsection3_6_2.html

2. Bott, A., Monthly Weather Review **117**: 1006–1015 (1989) available on-line at:
http://ams.allenpress.com/archive/1520-0493/117/5/pdf/i1520-0493-117-5-1006.pdf

Related:

- Van Leer, B. *Towards the Ultimate Conservative Difference Scheme V: A Second-Order Sequel to Godunovs Method*, Journal of Computational Physics **32** (1979).