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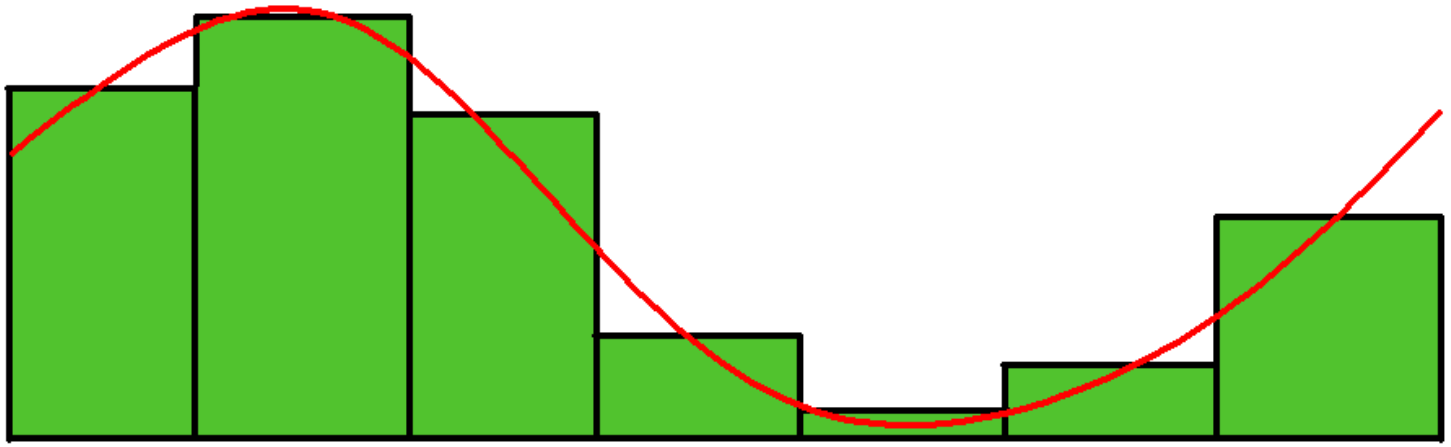
1 paper

[1] Thomas Guillet, Rdiger Pakmor, Volker Springel, Praveen Chandrashekar, Christian Klingenberg
“High-order Magnetohydrodynamics for Astrophysics with an Adaptive Mesh Refinement Discontinuous Galerkin Scheme”
arXiv:1806.02343

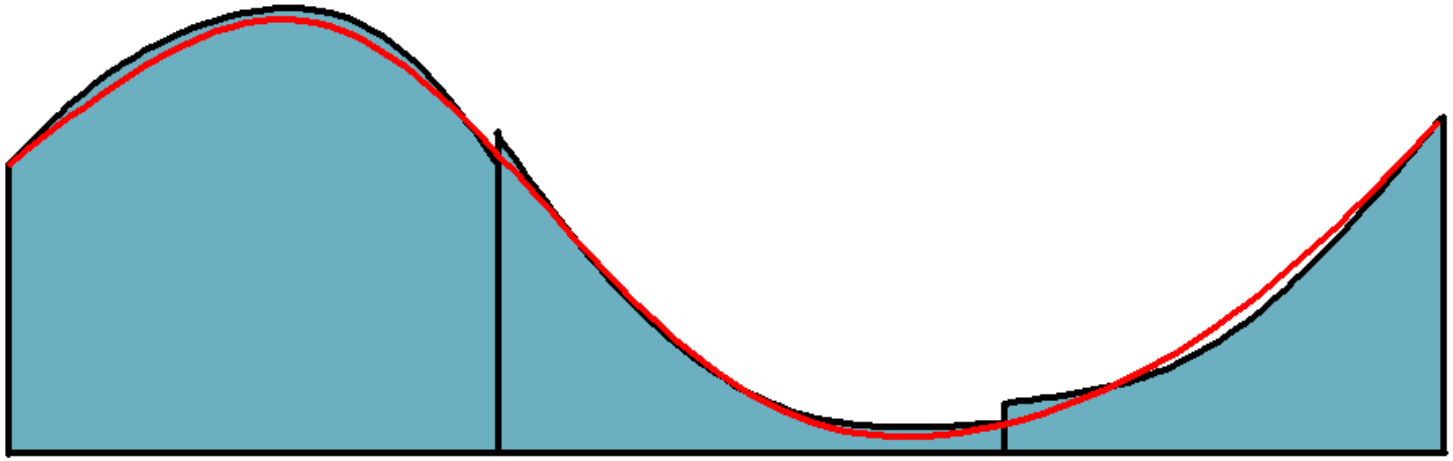
2 Introduction of [1]

- numerical simulation is a critical tool to study astronomical physics
- especially, hydrodynamic phenomena cannot be solved analytically
- galaxy formation needs high-performance implementations
- this paper is about the implementation of adaptive mesh DG calculation in the numerical package AREPO.

3 why discontinuous galerkin scheme(DG)?

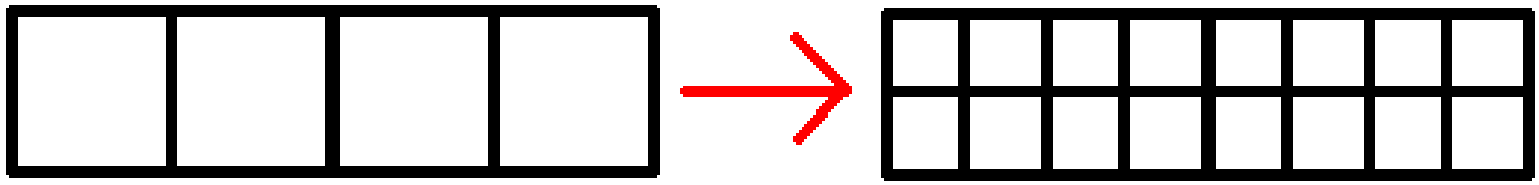


differential method(差分法)use piecewise constant approximation in the initial condition



DG method use piecewise polynomial approximation(ex. $ax^2 + bx + c$) in the initial condition

- higher-order accuracy(only in smooth problems)



-n_{th} order means that if we use twice smaller mesh, calculational error will be $\frac{1}{2^n}$

- can be stable(if we use limiter)
- good for parallel calculation

  -because DG method use smaller number of meshes compared to differential method, so there is less amount of data communication between cells, that prevent parallel calculation.

4 Applying Physics

5 DG Method

6 Techniques

7 Results

8 Discussion