Essentially Non-Osicillatory Schemes

simple guide

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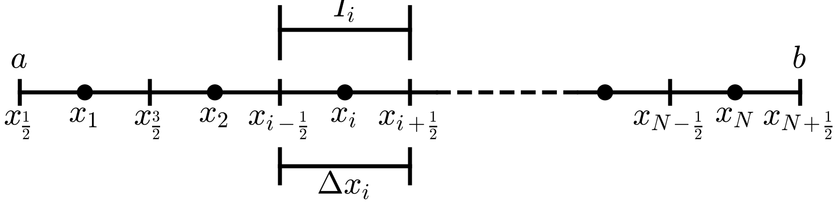
Definition of One Space Dimension

Given a grid

$$a = x_{\frac{1}{2}} < x_{\frac{3}{2}} < \dots < x_{N-\frac{1}{2}} < x_{N+\frac{1}{2}} = b$$



We define

Cells $I_i = [x_{i-\frac{1}{2}}, x_{i+\frac{1}{2}}]$

Cell centers $x_i = \frac{1}{2}(x_{i-\frac{1}{2}} + x_{i+\frac{1}{2}})$

Cell sizes $\Delta x = x_{i+\frac{1}{2}} - x_{i-\frac{1}{2}}$

Cell Averages

Given the cell averages of a function $v(x)$

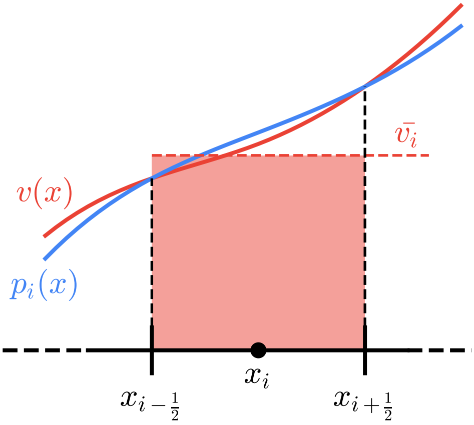
$$\bar{v}_i \equiv \frac{1}{\Delta x_i} \int_{x_{i-\frac{1}{2}}}^{x_{i+\frac{1}{2}}} v(\xi) d\xi$$

find a polynomial $p_i(x)$, of degree at most $k-1$, for each cell I_i. It is a k-th order accurate approximation to $v(x)$

$$v(x) = p_i(x) + O(\Delta x^k)$$

$$x \in I_i$$

$$i = 1, ..., N$$



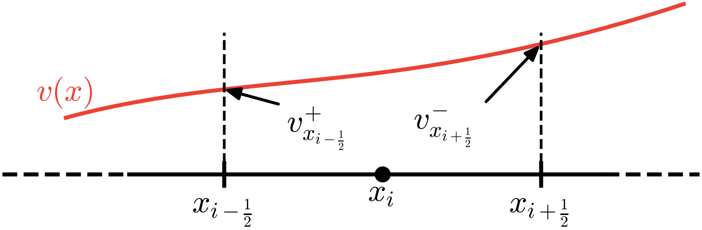
One Dimensional Reconstruction

$p_i(x)$ gives approximations to the function $v(x)$ at the cell boundaries:

$$v^-_{i+\frac{1}{2}} \leftarrow p_i(x_{i+\frac{1}{2}}) = v(x_{i+\frac{1}{2}}) + O(\Delta x^k)$$

$$v^+_{i-\frac{1}{2}} \leftarrow p_i(x_{i-\frac{1}{2}}) = v(x_{i-\frac{1}{2}}) + O(\Delta x^k)$$

$$i = 1, ..., N$$



This is a Block

This is important information

This is an Alert block

This is an important alert

This is an Example block

This is an example

Example of columns 1

There are two handy environments for structuring a slide: "blocks", which divide the slide (horizontally) into headed sections, and "columns" which divides a slide (vertically) into columns. Blocks and columns can be used inside each other.

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into two lines

Mathematics

Example

The function $\phi \colon \mathbb{R} \to \mathbb{R}$ given by $\phi(x) = 2x$ is continuous at the point $x = \alpha$, because if $\epsilon > 0$ and $x \in \mathbb{R}$ is such that $|x - \alpha| < \delta = \frac{\epsilon}{2}$, then

$$|\phi(x) - \phi(\alpha)| = 2|x - \alpha| < 2\delta = \epsilon.$$