myError

Errors in the myError module have been calculated as follows:

Absolute Errors

$$L_n = \sqrt[n]{\sum_i \sum_j \left|\text{error}_{ij}\right|^n} = \sqrt[n]{\sum_i \sum_j \left|f_{ij} - \left(f_{ij}\right)_{exact}\right|^n}$$

Normalized Errors

$$(L_n)_{normalized} = \frac{\sqrt[n]{\sum_i \sum_j \left|\text{error}_{ij}\right|^n}}{\sqrt[n]{\sum_i \sum_j \left|\left(f_{ij}\right)_{exact}\right|^n}} = \frac{\sqrt[n]{\sum_i \sum_j \left|f_{ij} - \left(f_{ij}\right)_{exact}\right|^n}}{\sqrt[n]{\sum_i \sum_j \left|\left(f_{ij}\right)_{exact}\right|^n}}$$

Note

When the exact solution is zero, 1 is added to the denominator in order to avoid division by zero.

Examples of normalized Errors

So, the L_1, L_2 and L_∞ norms were calculated as:

$$L_2 = \frac{\sqrt{\sum_i \sum_j \left\{f_{ij} - \left(f_{ij}\right)_{exact}\right\}^2}}{\sqrt{\sum_i \sum_j \left\{\left(f_{ij}\right)_{exact}\right\}^2}}$$

$$L_1 = \frac{\sqrt{\sum_i \sum_j \left|f_{ij} - \left(f_{ij}\right)_{exact}\right|}}{\sqrt{\sum_i \sum_j \left|\left(f_{ij}\right)_{exact}\right|}}$$

$$L_\infty = \frac{\sqrt{\sum_i \sum_j \left\{f_{ij} - \left(f_{ij}\right)_{exact}\right\}^2}}{\sqrt{\sum_i \sum_j \left\{\left(f_{ij}\right)_{exact}\right\}^2}}$$