|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **TEST: Reaction 3rd order Runge-Kutta method** | | | | | | | | | | | | | | | |
| Conceptualization of Test  Advection uniform flow test.png | | | | | | | | | Test Description: (Do we need this?)  Linear reaction ODE solver for constant first order decay | | | | | | |
| Test Setup | | | | | | | | | | | | | | | |
| Process Tested | | | | Dispersion Coeff.  (m2/s) | Decay Rate  (1/sec) | | | Flux Limiter | | Domain Length | # Grid Cells | | | Time Step (S) | # Time Steps |
| Advection (Flow) | Diffusion (Mixing) | Reaction (Decay) | |
| - | - | ✓ | | NA | 0.01 | | | Off | | NA | NA | | | 16 | 40 |
| NA | | | 8 | 20 |
| NA | | | 4 | 10 |
|  | | | | | | | | | | | | | | | |
| Dimensionless Parameters | | | | | | | | | | | | | | | |
| Courant #: Courant Number.png | | | Mesh Peclet #: Mesh Peclet Number.png | | | | Diffusion #: Diffusion Number.png | | | | | DamKohler #  Damkohler Number.png | | | |
| ≤1: required for stability | | | ≤1: dispersion dominant | | | | ≤0: required for stability | | | | | ≤1: Advection dominates | | | |
| NA | | | NA | | | | NA | | | | | NA | | | |
|  | | |  | | | |  | | | | |  | | | |
|  | | | | | | | | | | | | | | | |
| Test Results | | | | | | | | | | | | | | | |
| Plot of Results | | | | | | | | | Comments :  Linear decay equation solves by Heun ODE solver and results are compared with analytical solution | | | | | | |
| Numerical Order of Accuracy and Convergence | | | | | | | | | | | | | | | |
| Grid Cell Refinement (Increase # Grid Cells) | | Order of Accuracy Measure (L-1norm) Target: ≤ 1% | | | | Convergence Measure  (L-1 norm) Target: value ≥2 | | | | | | | Comments | | |
| 1-2 | | 6.27E-4 | | | | 3.09 | | | | | | | Test officially passes the defined criteria | | |
| 7.35E-5 | | | | 3rd Order Accurate | | | | | | |
| 2-4 | | 8.89E-6 | | | | 3.04 | | | | | | |
| OK | | | | 3rd Order Accurate | | | | | | |
| Bottom Line: (What should I mention here?) | | | | | | | | | | | | | | | |