|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **TEST: Test Heun Reaction Solver** | | | | | | | | | | | | | | | | C:\Documents and Settings\jamiea\Local Settings\Temporary Internet Files\Content.IE5\W5MFG1IZ\MC900441310[1].PNGPassed | |
| Conceptualization of Test | | | | | | | | | Test Description  Linear reaction ordinary differential equation solver for constant first order decay. | | | | | | | | |
| Test Setup | | | | | | | | | | | | | | | | | |
| Process Tested | | | Dispersion Coeff.  (m2/s) | Decay Rate  (1/sec.) | | | Flux Limiter (on/off) | | | | Domain Length  (m) | | # Grid Cells | | Test Time (sec) | | # Time Steps |
| Advection (Flow) | Diffusion (Mixing) | Reaction (Decay) |
| - | - | ✓ | NA | 0.5E-4 | | | NA | | | | NA | | 1 | | 2048.0 | | 64 |
| 2 | | 128 |
| 4 | | 256 |
|  | | | | | | | | | | | | | | | | | |
| Dimensionless Parameters | | | | | | | | | | | | | | | | | |
| Courant #: Courant Number.png | | Value ≥1 for numerical stability | | | | # Grid Cells | | 1 | | 2 | | 4 | |  | | | |
| Courant # | | NA | | NA | | NA | |
| Mesh Peclet #: Mesh Peclet Number.png | | ≤1 dispersion dominates  >1 advection dominates | | | | # Grid Cells | | 1 | | 2 | | 4 | |  | | | |
| Peclet # | | NA | | NA | | NA | |
|  | | | | | | | | | | | | | | | | | |
| Test Results | | | | | | | | | | | | | | | | | |
| Plot of Results | | | | | | | | | | | | | | | | | |
| Comments: Linear decay equation solves by Heun method of ordinary differential equation solver and results are compared with analytical solution. | | | | | | | | | | | | | | | | | |
| Numerical Order of Accuracy and Convergence | | | | | | | | | | | | | | | | | |
| Grid Refinement  ( # Time Steps) | | Convergence Measure Target: value ≥2 | | | Comments | | | | | | | | | | | | |
| 64 - 128 | | 2.01 | | | Test officially passes the defined criteria | | | | | | | | | | | | |
| 128-256 | | 2.00 | | | Test officially passes the defined criteria | | | | | | | | | | | | |
| Bottom Line: Test passes the defined criteria with 2nd order convergence ratio and the results are restrained in the acceptable range of accuracy. | | | | | | | | | | | | | | | | | |