|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **TEST: Advection Uniform Flow- Linear Reaction** | | | | | | | | | | | | | | | | C:\Documents and Settings\jamiea\Local Settings\Temporary Internet Files\Content.IE5\W5MFG1IZ\MC900441310[1].PNGPassed | |
| Conceptualization of Test | | | | | | | | | Test Description:  Advection uniform flow, Gaussian mass distribution, subjected to linear decay. | | | | | | | | |
| Test Setup | | | | | | | | | | | | | | | | | |
| Process Tested | | | Dispersion Coeff.  (m2/s) | Decay Rate  (1/sec) | | | Flux Limiter (on/off) | | | | Domain Length  (km) | | # Grid Cells | | Test Time (sec) | | # Time Steps |
| Advection (Flow) | Diffusion (Mixing) | Reaction (Decay) |
| ✓ | - | ✓ | NA | 0.0003 | | | Off | | | | 51.2 | | 256 | | 600.0 | | 32 |
| 512 | | 64 |
| 1024 | | 128 |
|  | | | | | | | | | | | | | | | | | |
| Dimensionless Parameters | | | | | | | | | | | | | | | | | |
| Courant #: Courant Number.png | | Value ≥1 for numerical stability | | | | # Grid Cells | | 256 | | 512 | | 1024 | | Stable: ✓ | | | |
| Courant # | | 0.75 | | 0.75 | | 0.75 | |
| Mesh Peclet #: Mesh Peclet Number.png | | ≤1 dispersion dominates  >1 advection dominates | | | | # Grid Cells | | 64 | | 128 | | 256 | |  | | | |
| Peclet # | | NA | | NA | | NA | |
|  | | | | | | | | | | | | | | | | | |
| Test Results | | | | | | | | | | | | | | | | | |
|  | | | | | | | | | | | | | | | | | |
| Advection subjected to uniform flow, and a linear decay equation solves by Heun method, ordinary differential equation solver and results are compared with analytical solution. | | | | | | | | | | | | | | | | | |
| Numerical Order of Accuracy and Convergence | | | | | | | | | | | | | | | | | |
| Grid Cell Refinement (Increase # Grid Cells) | | Convergence Measure Target: value ≥2 | | | Comments | | | | | | | | | | | | |
| 256-512 | | 2.05 | | | Test officially passes the defined criteria | | | | | | | | | | | | |
| 512-1024 | | 2.11 | | | 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. | | | | | | | | | | | | | | | | | |