|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **TEST: Advection Diffusion Reaction Remote Boundary Condition** | | | | | | | | | | | | | | | | C:\Documents and Settings\jamiea\Local Settings\Temporary Internet Files\Content.IE5\W5MFG1IZ\MC900441310[1].PNGacceptable | |
| Conceptualization of Test | | | | | | | | | Test Description  Uniform flow field, Gaussian initial distribution of mass, zero remote concentration boundary condition, linear decay, and constant dispersion coefficient, compares with the analytical solution. | | | | | | | | |
| 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) |
| ✓ | ✓ | ✓ | 16 | 5.0E-5 | | | Off | | | | 25.6 km | | 64 | | 38400 | | 64 |
| 128 | | 128 |
| 256 | | 256 |
|  | | | | | | | | | | | | | | | | | |
| Dimensionless Parameters | | | | | | | | | | | | | | | | | |
| Courant #: Courant Number.png | | Value ≥1 for numerical stability | | | | # Grid Cells | | 64 | | 128 | | 256 | | Stable: ✓ | | | |
| Courant # | | 0.9 | | 0.9 | | 0.9 | |
| Mesh Peclet #: Mesh Peclet Number.png | | ≤1 dispersion dominates  >1 advection dominates | | | | # Grid Cells | | 64 | | 128 | | 256 | | Advection Dominates | | | |
| Peclet # | | 15 | | 7.5 | | 3.75 | |
|  | | | | | | | | | | | | | | | | | |
| Test Results | | | | | | | | | | | | | | | | | |
|  | | | | | | | | | | | | | | | | | |
| The initial distribution of mass is shifted forward, diffused and meanwhile linearly decayed and the result is compared with analytical solution. | | | | | | | | | | | | | | | | | |
| Numerical Order of Accuracy and Convergence | | | | | | | | | | | | | | | | | |
| Grid Cell Refinement (Increase # Grid Cells) | | Convergence Measure Target: value ≥2 | | | Comments | | | | | | | | | | | | |
| 64-128 | | 1.86 | | | Test passes, acceptability | | | | | | | | | | | | |
| 128-256 | | 1.91 | | | Test passes, acceptability | | | | | | | | | | | | |
| Bottom Line: Test is acceptable in the defined criteria with the 2nd order convergence ratio and the results are in the acceptable range of accuracy. | | | | | | | | | | | | | | | | | |