|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **TEST: Advection-Dispersion-Reaction for Uniform Flow, Gaussian, Dirichlet remote BC** | | | | | | | | | | | | | | | |
| Conceptualization of Test  Advection uniform flow test.png | | | | | | | | | Test Description: (Do we need this?)  Uniform flow field, Gaussian initial distribution of mass, trivial-zero concentration boundary condition, linear decay, and constant dispersion coefficient, compares with analytical solution | | | | | | |
| 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) | |
| ✓ | - | - | | 16 | 5E-5 | | | Off | | 25.6 km | 64 | | | 150 | 64 |
| 128 | | | 300 | 128 |
| 256 | | | 600 | 256 |
|  | | | | | | | | | | | | | | | |
| 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 | | | |
| 0.90 | | | 3.75-7.5-15 | | | | 0.24, 0.12,6E-2 | | | | | ???? | | | |
| stable | | | dispersion dominant | | | | stable | | | | | ???? | | | |
|  | | | | | | | | | | | | | | | |
| Test Results | | | | | | | | | | | | | | | |
| Plot of Results | | | | | | | | | Comments :  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) | | Order of Accuracy Measure (L-1norm) Target: ≤ 1% | | | | Convergence Measure  (L-1 norm) Target: value ≥2 | | | | | | | Comments | | |
| 64 - 128 | | 8.56E-5 | | | | 1.86 | | | | | | | Test passes the defined criteria, the results are acceptable | | |
| 2.35E-5 | | | | 2nd Order Accurate | | | | | | |
| 128 - 256 | | 6.27E-6 | | | | 1.91 | | | | | | |
| OK | | | | 2nd Order Accurate | | | | | | |
| Bottom Line: (What should I mention here?) | | | | | | | | | | | | | | | |