**Non conservative form Validation data**

**Flow field variables after 1 timestep**

RhoInitial=[1,0.955,0.927,0.900,0.872,0.844,0.817,0.789,0.760,0.731,0.701,0.670,0.637,0.603,0.567,0.531,0.494,0.459,0.425,0.392,0.361,0.330,0.301,0.271,0.242,0.213,0.184,0.154,0.125,0.095,0.066]

        Tinitial=[1,0.972,0.950,0.929,0.908,0.886,0.865,0.843,0.822,0.800,0.778,0.755,0.731,0.707,0.682,0.656,0.631,0.605,0.581,0.556,0.533,0.510,0.487,0.465,0.443,0.421,0.398,0.376,0.354,0.332,0.309]

        Vinitial=[0.111,0.212,0.312,0.411,0.508,0.603,0.695,0.784,0.870,0.954,1.035,1.113,1.188,1.260,1.328,1.394,1.455,1.514,1.568,1.619,1.666,1.709,1.748,1.782,1.813,1.838,1.858,1.874,1.884,1.890,1.895]

**Flow field variables after 1400 timestep**

        Rhofinal=[1,0.998,0.997,0.994,0.992,0.987,0.982,0.974,0.963,0.947,0.924,0.892,0.849,0.792,0.721,0.639,0.551,0.465,0.386,0.318,0.262,0.216,0.179,0.150,0.126,0.107,0.092,0.079,0.069,0.061,0.053];

        Tfinal=[1,0.999,0.999,0.998,0.997,0.995,0.993,0.989,0.985,0.978,0.969,0.956,0.937,0.911,0.878,0.836,0.789,0.737,0.684,0.633,0.585,0.541,0.502,0.467,0.436,0.408,0.384,0.362,0.342,0.325,0.308]

        Vfinal=[0.099,0.112,0.125,0.143,0.162,0.187,0.215,0.251,0.294,0.346,0.409,0.485,0.575,0.678,0.793,0.914,1.037,1.155,1.263,1.361,1.446,1.519,1.582,1.636,1.683,1.723,1.759,1.789,1.817,1.839,1.862]

**Note:**

**Use the above values for checking the accuracy of your code**

**You can use standard comparison techniques to compare your values with the above values**

**Conservative form Validation data**

**Flow field variables after 1 timestep**

RhoInitial=[1,1,1,1,1,0.999,0.963,0.927,0.891,0.854,0.818,0.781,0.744,0.707,0.670,0.633,0.594,0.555,0.517,0.478,0.440,0.401,0.362,0.324,0.285,0.246,0.208,0.169,0.131,0.093,0.063]

        Tinitial=[1,1,1,1,1,1,0.983,0.967,0.950,0.934,0.917,0.900,0.883,0.866,0.849,0.833,0.800,0.766,0.731,0.695,0.660,0.625,0.590,0.554,0.519,0.484,0.448,0.412,0.375,0.324,0.200]

        Vinitial=[0.099,0.111,0.125,0.141,0.160,0.187,0.228,0.271,0.325,0.389,0.467,0.557,0.656,0.759,0.854,0.930,0.979,0.992,0.975,0.939,0.893,0.848,0.809,0.781,0.766,0.768,0.791,0.846,0.949,1.133,1.438]

**Flow field variables after 1400 timestep**

Rhofinal=[1,0.999,0.997,0.995,0.992,0.988,0.982,0.974,0.962,0.946,0.923,0.891,0.847,0.789,0.718,0.648,0.548,0.462,0.384,0.316,0.260,0.214,0.177,0.148,0.124,0.106,0.090,0.078,0.068,0.060,0.052]

        Tfinal=[1,0.999,0.999,0.998,0.997,0.995,0.993,0.989,0.985,0.978,0.969,0.955,0.935,0.909,0.874,0.839,0.783,0.731,0.679,0.628,0.581,0.538,0.500,0.466,0.436,0.409,0.384,0.363,0.344,0.327,0.310]

        Vfinal=[0.098,0.110,0.124,0.141,0.161,0.184,0.213,0.249,0.292,0.344,0.408,0.485,0.577,0.682,0.798,0.904,1.046,1.164,1.272,1.368,1.452,1.524,1.586,1.639,1.685,1.725,1.760,1.790,1.817,1.840,1.863]

**Note:**

**Use the above values for checking the accuracy of your code**

**You can use standard comparison techniques to compare your values with the above values**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Density Ratio | Temperature Ratio | Pressure Ratio | Mach Number |
| Exact Analytical Solution | 0.634 | 0.833 | 0.528 | 1.000 |
| Non-Conservative Form (30 Points) | 0.639 | 0.836 | 0.534 | 0.999 |
| Non-Conservative Form (60 Points) | 0.638 | 0.835 | 0.533 | 1.000 |
| Conservative Form (30 Points) | 0.650 | 0.840 | 0.546 | 0.982 |
| Conservative Form (60 Points) | 0.638 | 0.835 | 0.533 | 0.999 |