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1 from TimeIntegration import initialization, IntegrateTime
2 from InputVariables import var, ngc
3 from FixedVariables import tmax, rho, p, v, nsnap
4
5 def U(x, var, nx):
6     u = []
7     if var == 'mass density':
8         for i in range(ngc, nx + ngc):
9             u.append(rho(x[i]))
10    elif var == 'velocity':
11        for i in range(ngc, nx + ngc):
12            u.append(v(x[i])[0])
13    elif var == 'pressure':
14        for i in range(ngc, ngc + nx):
15            u.append(p(x[i]))
16    else:
17        print('no valid variable')
18    return u
19
20 def upwind_solver(nx):
21     solution = []
22     time = []
23     x = initialization(nx)
24     t = 0
25     time_snap = tmax/nsnap
26     snap = time_snap
27     solution.append(U(x, var, nx))
28     time.append(t)
29     while t < tmax:
30         if t >= snap:
31             dt, x = IntegrateTime(x, nx)
32             t += dt
33             solution.append(U(x, var, nx))
34             time.append(t)
35             snap += time_snap
36         else:
37             dt, x = IntegrateTime(x, nx)
38             t += dt
39     solution.append(U(x, var, nx))
40     time.append(t)
41     return solution, time
42
43
44
45
46
```