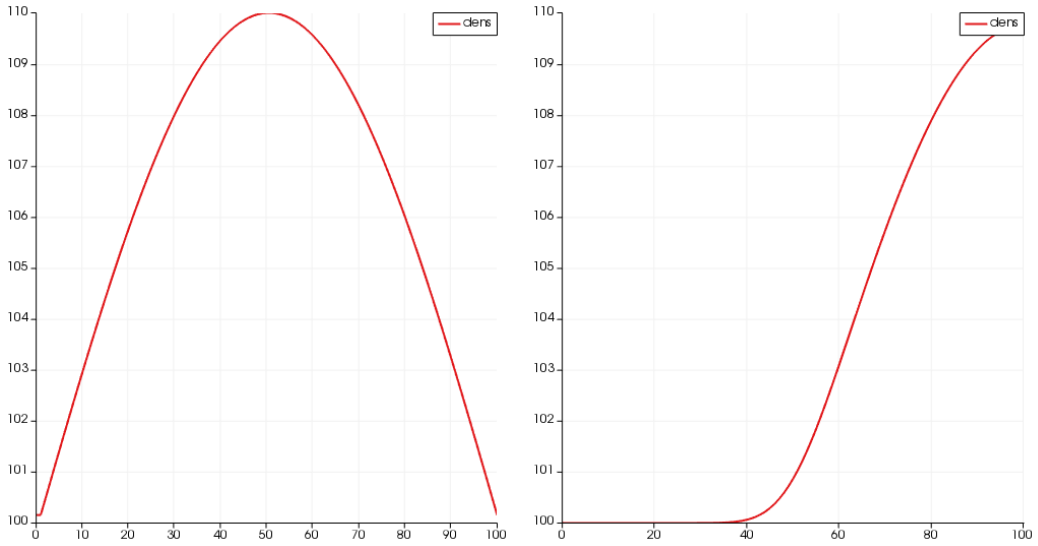
1 Advection

1.1 advec1-t

- *advec1-t.i*
- 1D generated mesh with libmesh
- Uses DG Kernels
- InflowBC and OutflowBC
- Transient problem

Figure 1 shows the results. Advects BC. It seems like the variable has to be a CONSTANT MONOMIAL.

$$\frac{\partial}{\partial t}\rho + v\frac{\partial}{\partial x}\rho = 0 \tag{1}$$



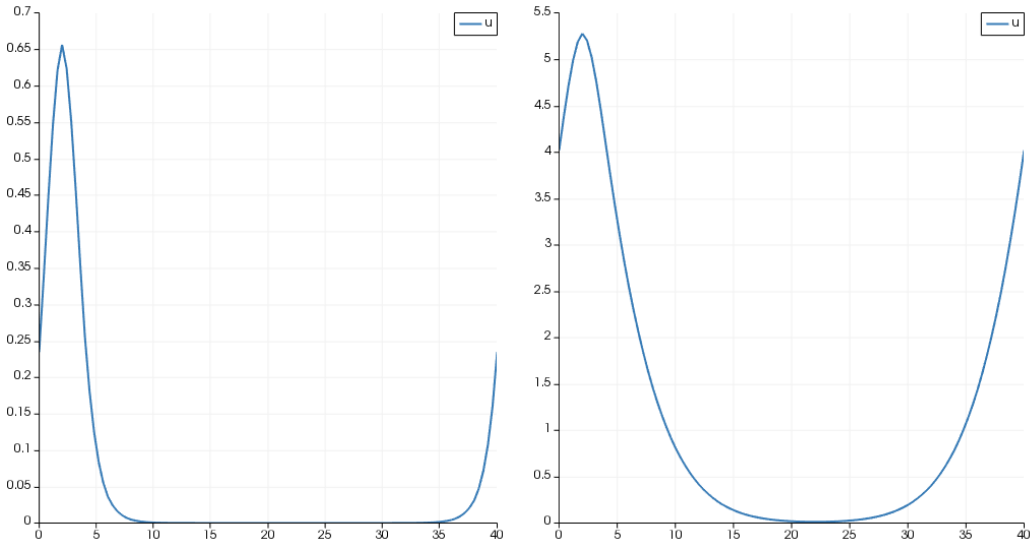
(a) t=0. (b) t=100.

Figure 1: Advected density.

1.2 periodic_bc2

- *moose/examples/ex04_bcs/periodic_bc2.i*
- 1D generated mesh with libmesh
- Periodic BCs
- Transient problem

In *advec1-t-bc.i* I tried to add periodicBCs to the previous problem and it does not work. Here I tried to isolate the problem. Figure 2 shows the results. It does not work if the valiable is a CONSTANT MONOMIAL. It works if the variable is FIRST order (either MONOMIAL or LAGRANGE).



(a) t=0. (b) t=20.

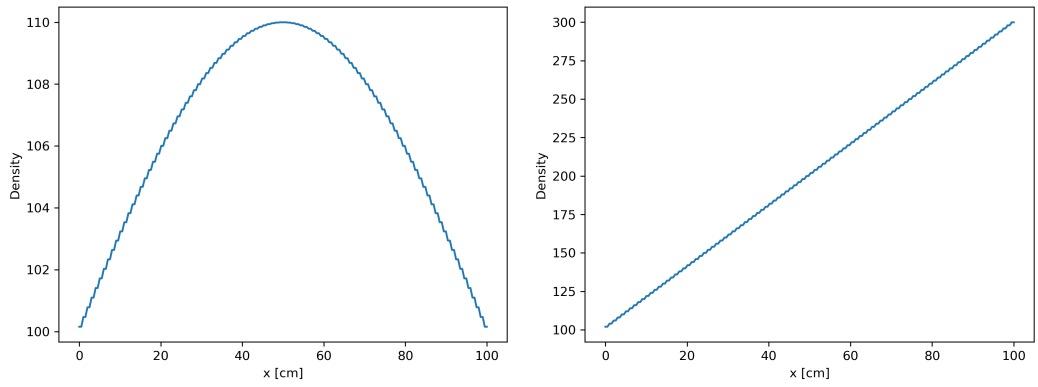
Figure 2: Periodic BCs.

1.3 advec2-t

- *advec2-t.i*
- 1D generated mesh with libmesh
- Uses DG Kernels
- TemperatureInflowBC and TemperatureOutflowBC
- Transient problem

Very similar to *advec1-t.i*. Adds volumetric source. Figure 3 shows the results.

$$\frac{\partial}{\partial t}\rho + v\frac{\partial}{\partial x}\rho = \dot{q} \tag{2}$$



(a) t=0. (b) t=250.

Figure 3: Advected density with volumentric source.

1.4 advec2-ss

- *advec2-ss.i*
- 1D generated mesh with libmesh
- Uses DG Kernels
- Inflow and OutflowBC
- Steady problem

Same as *advec2-t* but steady state. Figure 4 shows the results.

$$v\frac{\partial}{\partial x}\rho = \dot{q} \tag{3}$$

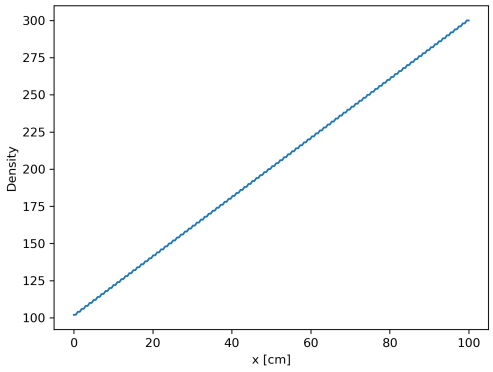


Figure 4: Steady state solution.

1.5 advec3-t

- *advec3-t.i*
- 1D generated mesh with libmesh
- Uses DG Kernels
- TemperatureInflowBC and TemperatureOutflowBC
- Transient problem

Very similar to *advec1-t.i*. Solves for the temperature advection equation. Advects BC. Figure 5 shows the results.

$$\rho c_p \frac{\partial}{\partial t}T + \rho c_p v \frac{\partial}{\partial x}T = 0 \tag{4}$$

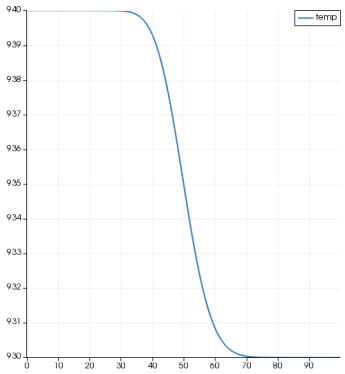


Figure 5: Advects BC.

1.6 advec4-t

- *advec4-t.i*
- 1D generated mesh with libmesh
- Uses DG Kernels
- TemperatureInflowBC and TemperatureOutflowBC
- Transient problem

Similar to *advec4-t.i* Adds a point source and solves for temperature. Figure 6 shows the results.

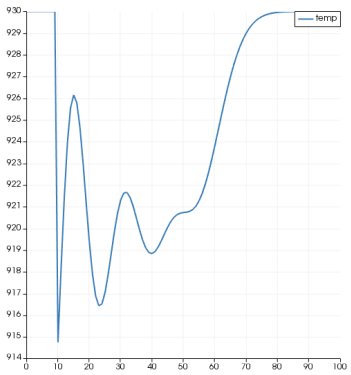


Figure 6: Advected temperature from point source.

1.7 advec5-t

- *advec5-t.i*
- pseudo-1D: 2D-coolant.msh
- Uses DG Kernels
- TemperatureInflowBC and TemperatureOutflowBC
- Transient problem

Similar to *advec5-t.i* but has a q'' on the wall. Figure 7 shows the results.

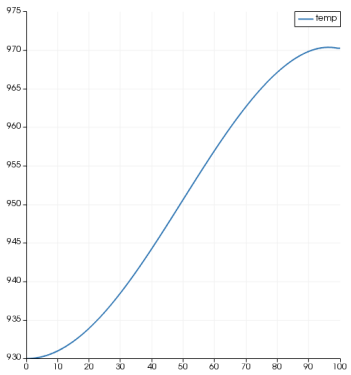


Figure 7: Advects temperature while wall is been heated.