Legend:

- **Complete item**
- **Incomplete item**

Marco and I met to discuss my questions asked by email, namely why the solution given by the method of characteristics at the boundary, which are at the new time value, t^{n+1}, are of interest, since we are using explicit Euler, which only is concerned with values at t^n. The answer is that Marco had intended that I strongly impose the values given by the characteristics, instead of using them to compute the boundary fluxes, as I had been doing previously.

The other question I had was how to implement wall boundary conditions, namely the condition $\mathbf{v} \cdot \mathbf{n} = 0$ in 2-D; my confusion was that setting the normal component of the velocity only fixed one of two degrees of freedom for the velocity, so I didn't know what the other component was. The answer was that it didn't matter; the boundary fluxes only require knowledge of $\mathbf{v} \cdot \mathbf{n}$. Therefore the wall condition cancels the continuity boundary fluxes and just leaves a "pressure" term in the momentum boundary fluxes.

We also ran the code with entropy viscosity for the perturbed lake-at-rest problem and couldn't find parameters that allowed a steady-state to be achieved. It was suggested that I might try the following:

1. Smoothing the perturbation profile instead of having a step function, and
2. Smoothing the viscosity variations between cells, e.g., take the viscosity to be the maximum of it and its neighbors. This prevents oscillations in the viscosity profile.

References

[1] D. Kuzmin, R. Löhner, and S. Turek. *Flux-Corrected Transport*. Springer-Verlag Berlin Heidelberg, Germany, first edition, 2005.

[2] Eleuterio F. Toro. *Riemann Solvers and Numerical Methods for Fluid Dynamics*. Springer-Verlag, 2nd edition, 1999.