

Test Results for Mesh Hydro Code

This computer

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1 Advection

1.1 Piecewise Constant

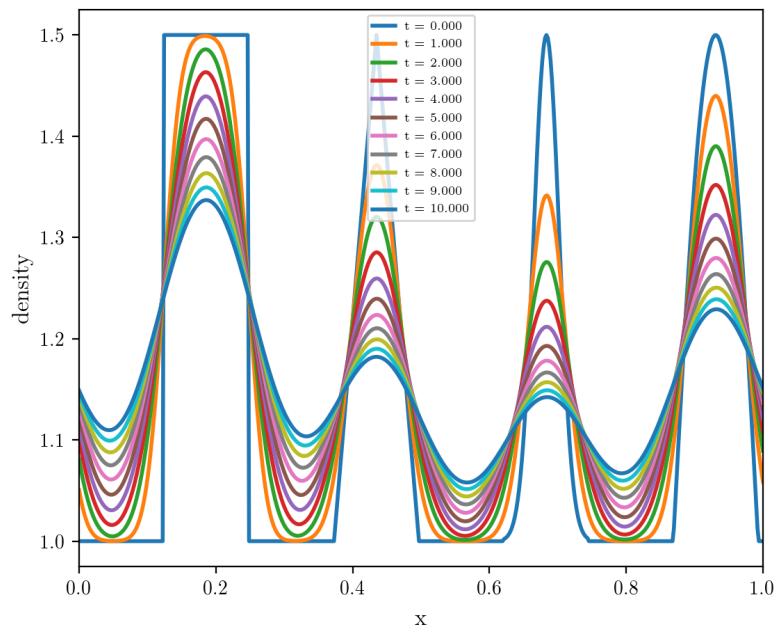


Figure 1: Expected result 1D

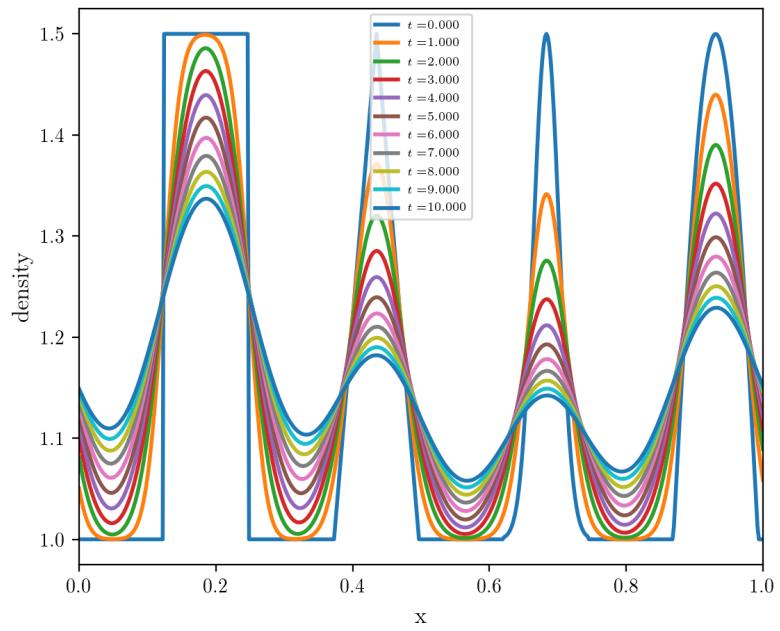


Figure 2: Obtained result 1D

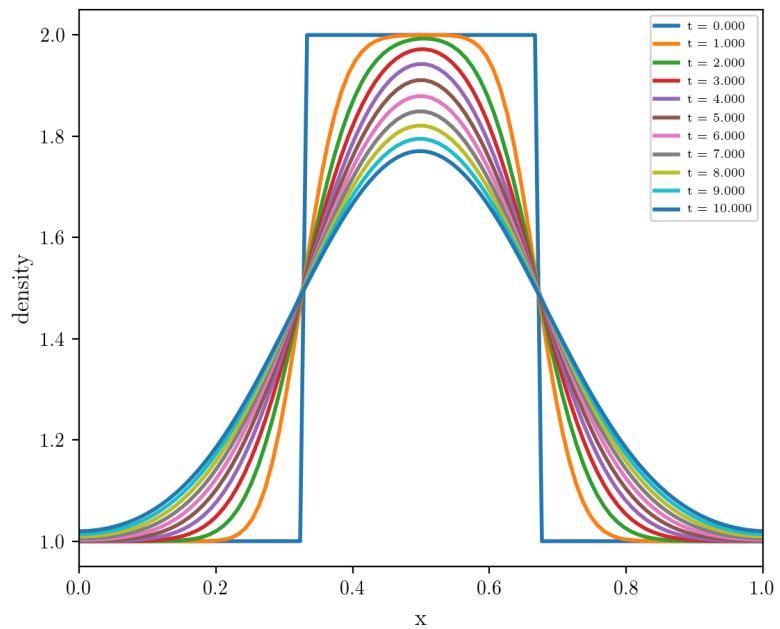


Figure 3: Expected result 1D negative velocity

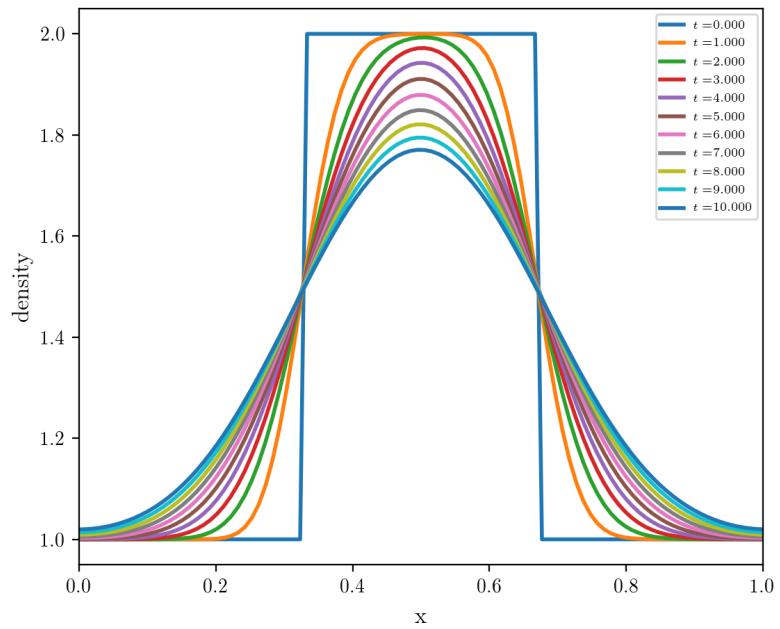


Figure 4: Obtained result 1D negative velocity

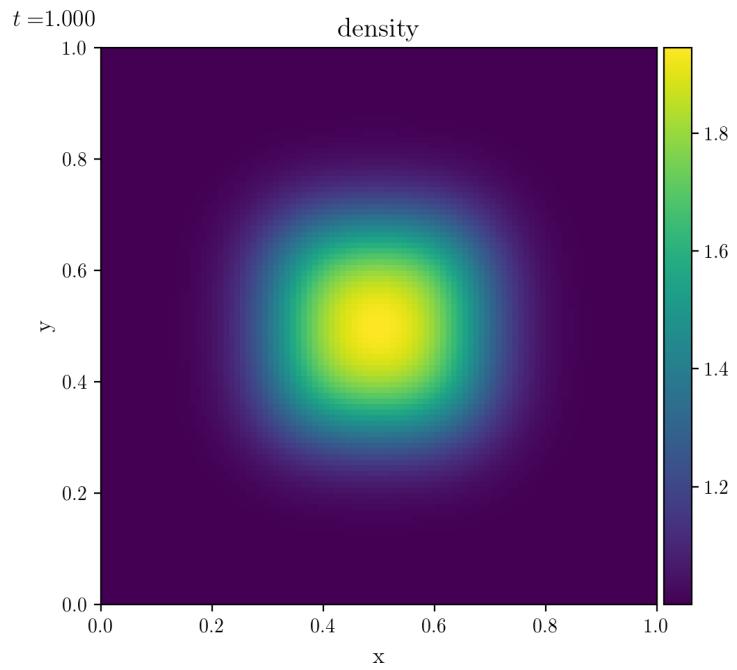


Figure 5: Expected result 2D

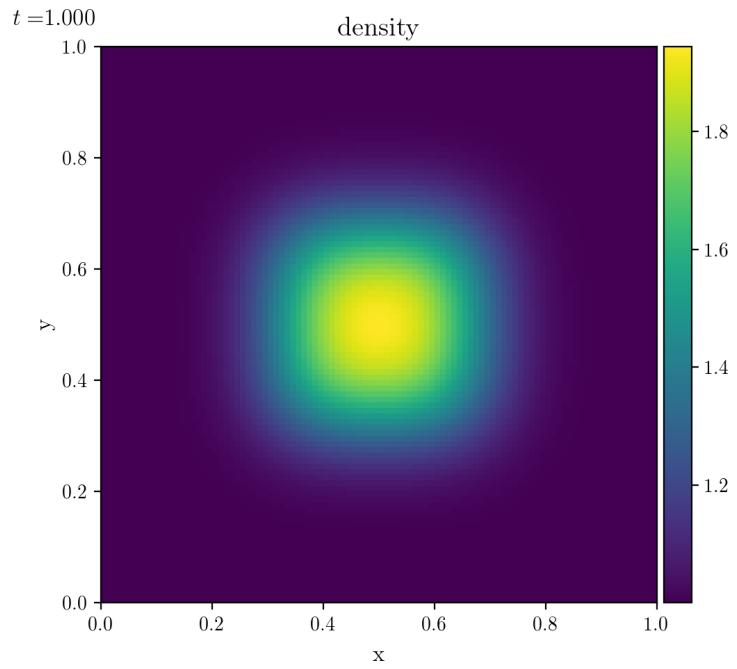


Figure 6: Obtained result 2D

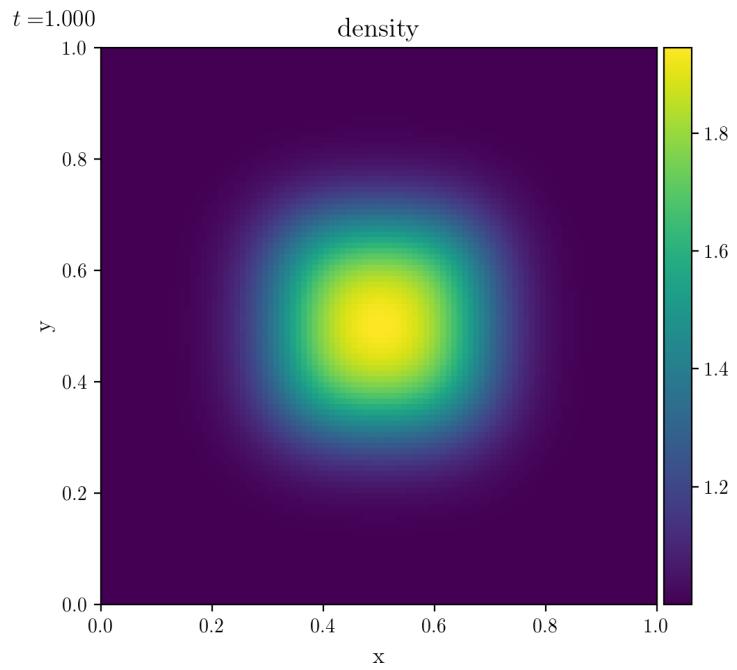


Figure 7: Expected result 2D negative velocity

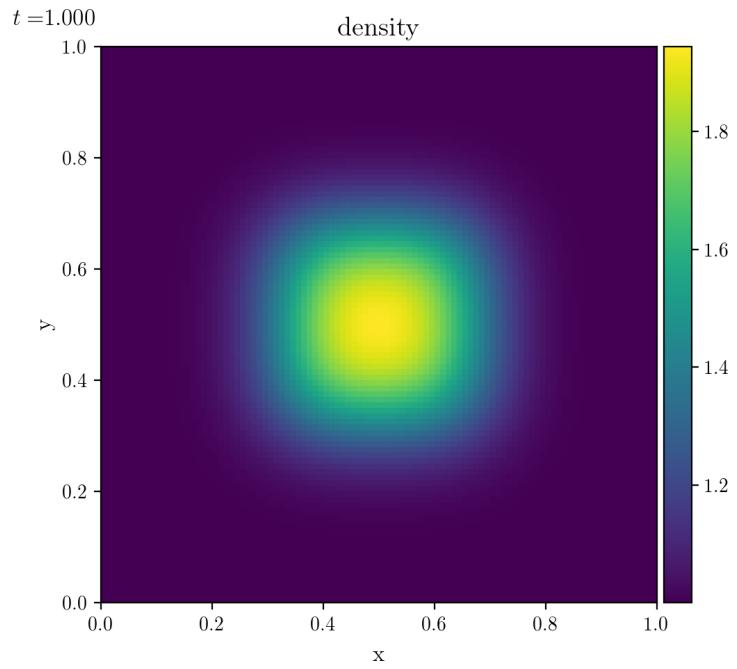


Figure 8: Obtained result 2D negative velocity

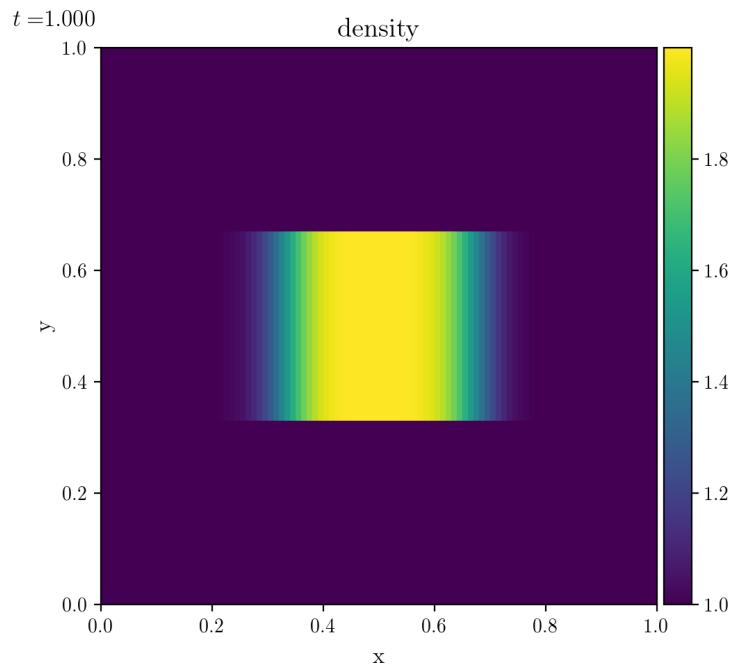


Figure 9: Expected result 2D velocity in x direction only

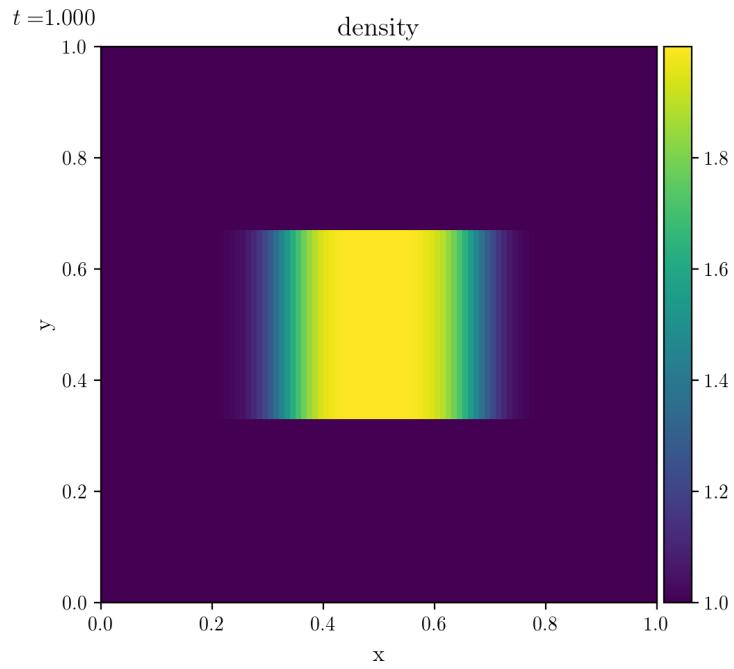


Figure 10: Obtained result 2D velocity in x direction only

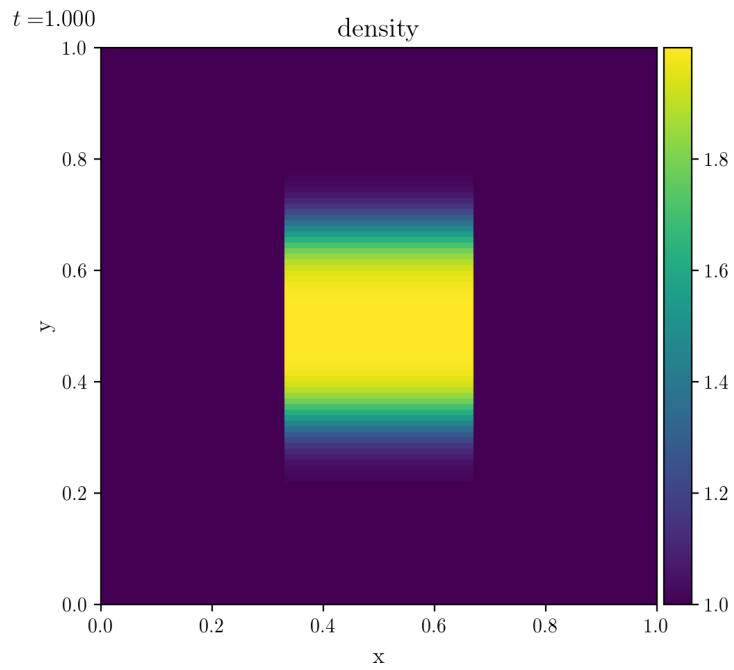


Figure 11: Expected result 2D velocity in y direction only

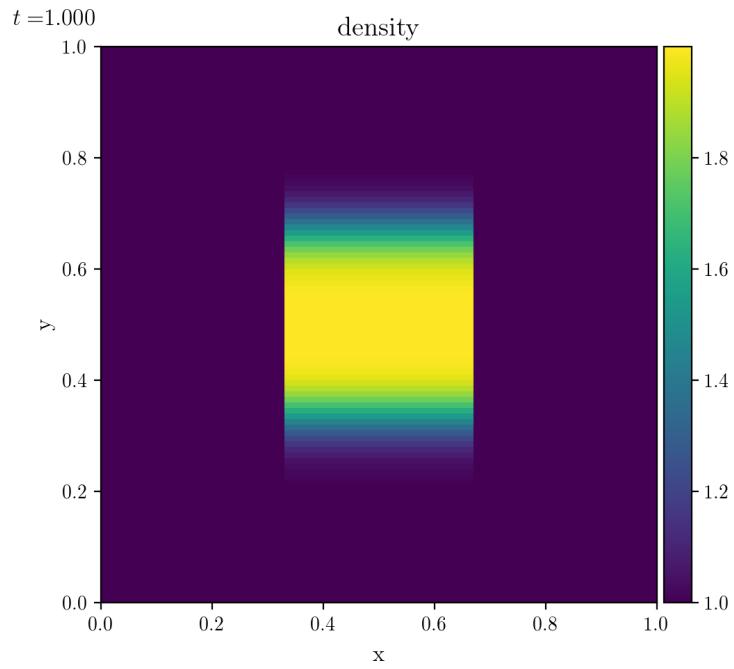


Figure 12: Obtained result 2D velocity in y direction only

1.2 Piecewise Linear

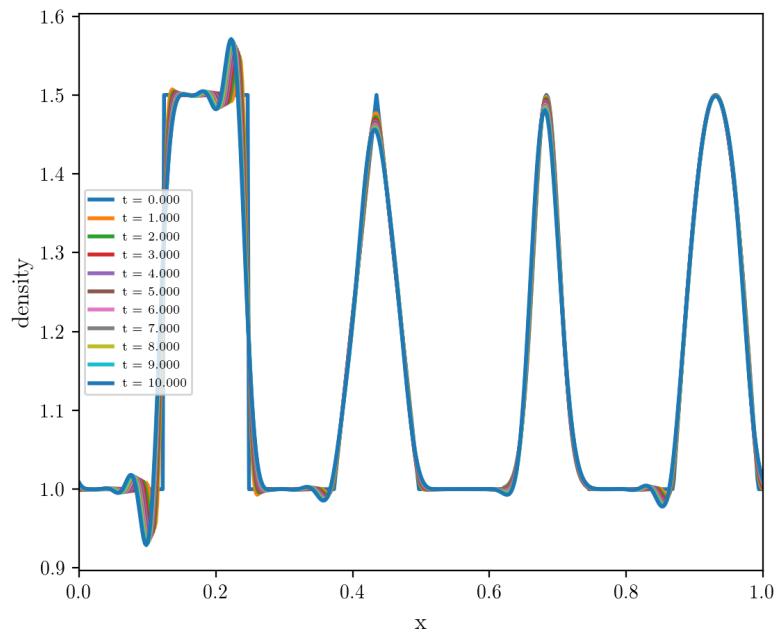


Figure 13: Expected result 1D

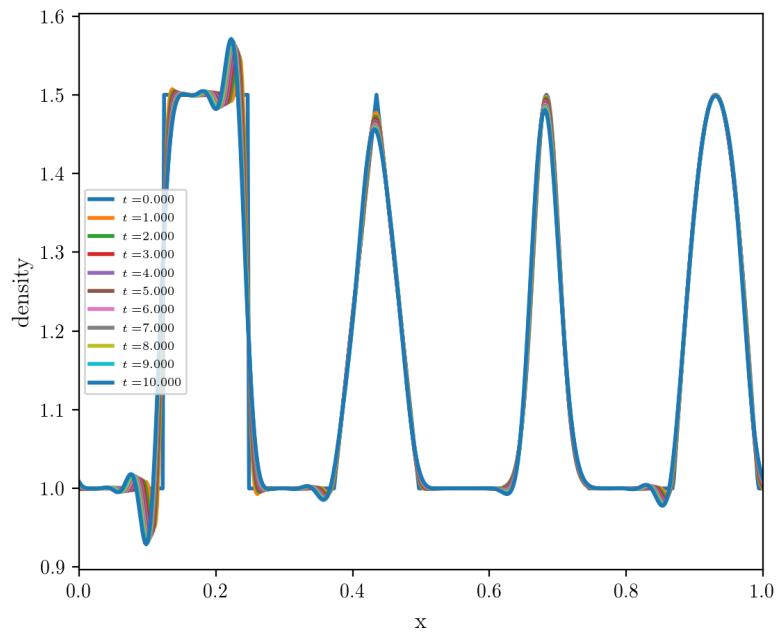


Figure 14: Obtained result 1D

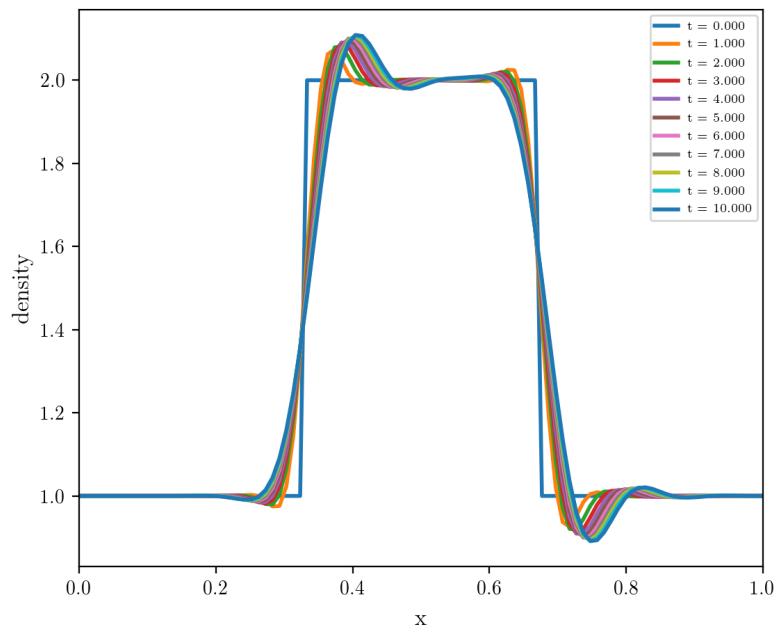


Figure 15: Expected result 1D negative velocity

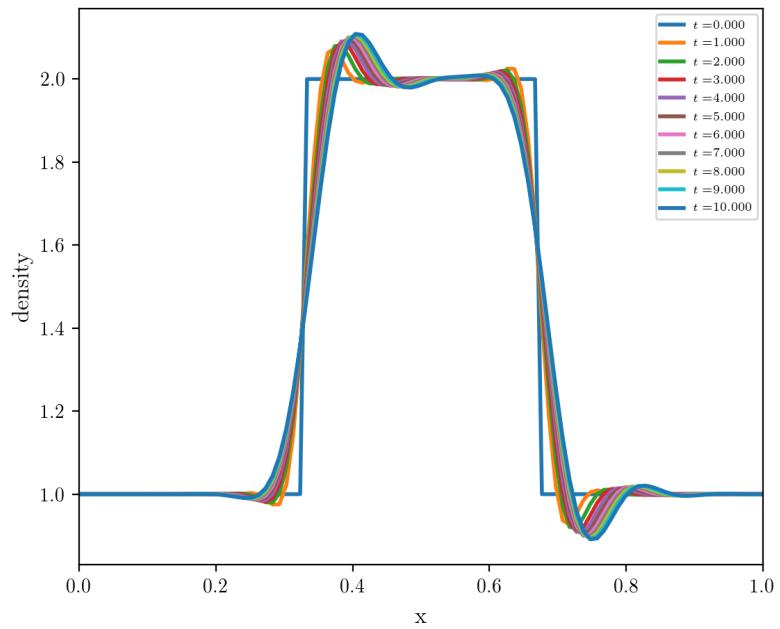


Figure 16: Obtained result 1D negative velocity

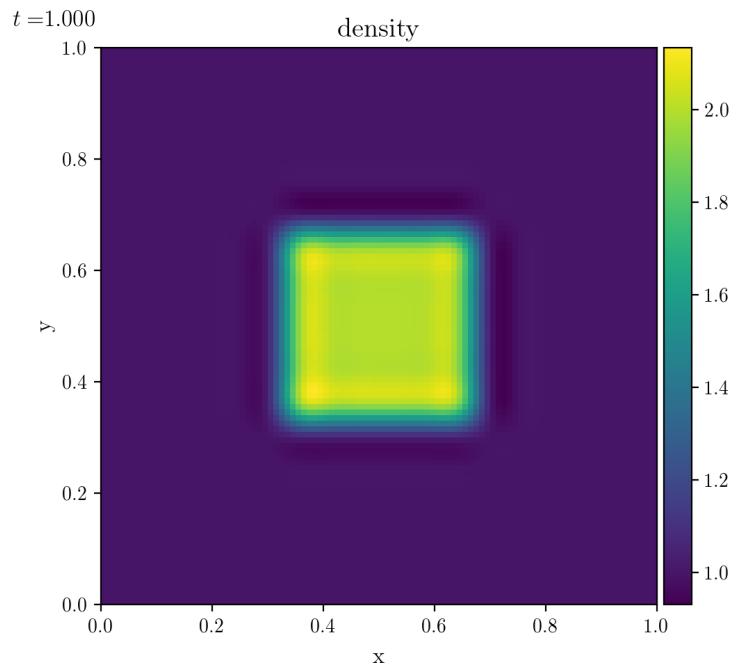


Figure 17: Expected result 2D

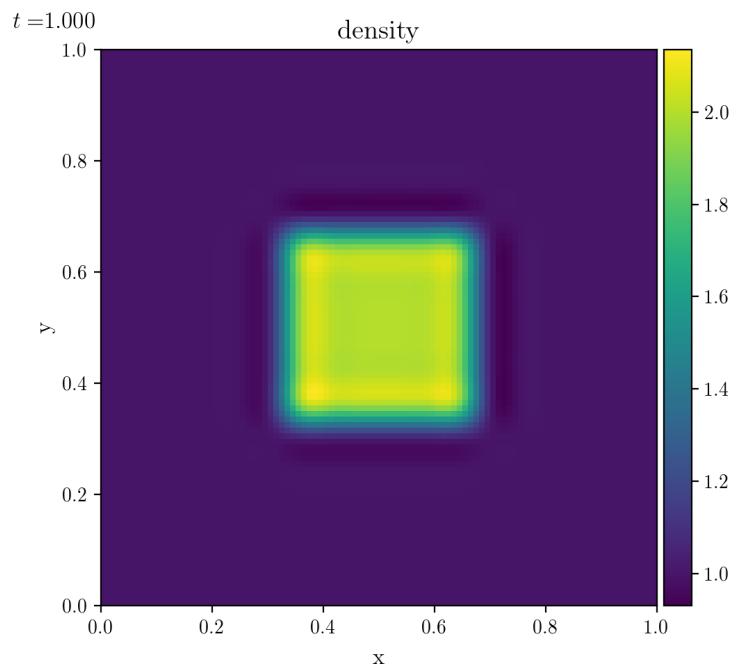


Figure 18: Obtained result 2D

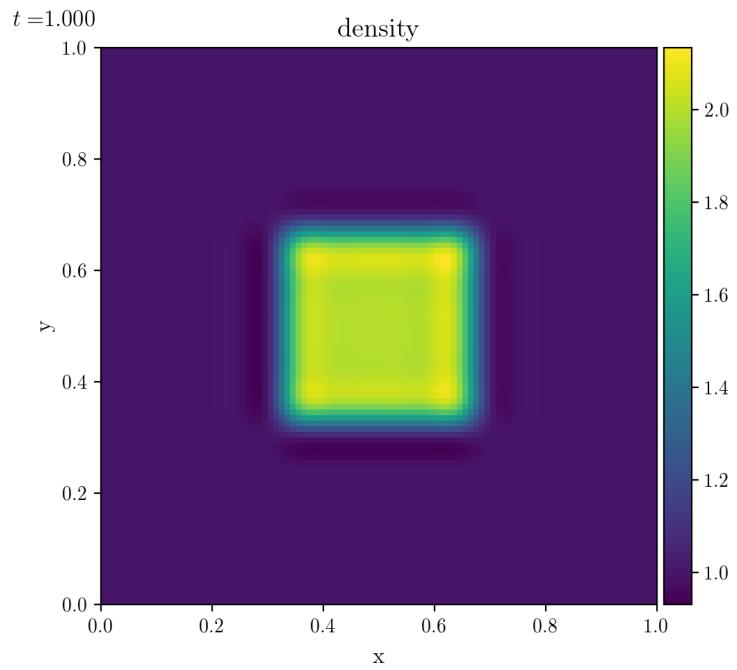


Figure 19: Expected result 2D negative velocity

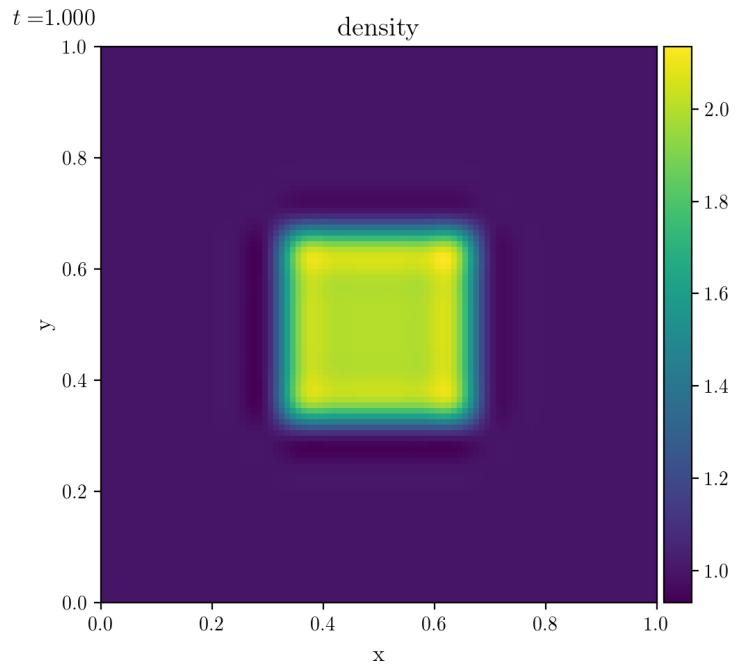


Figure 20: Obtained result 2D negative velocity

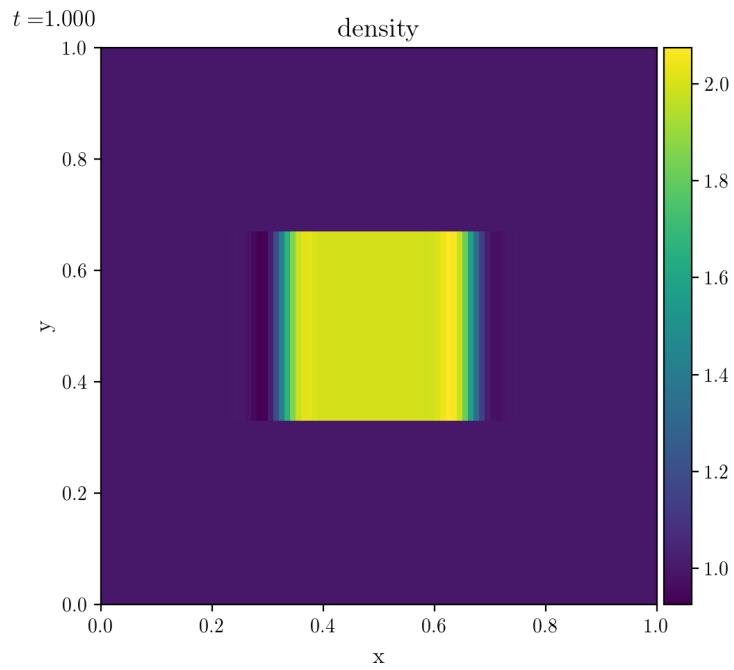


Figure 21: Expected result 2D velocity in x direction only

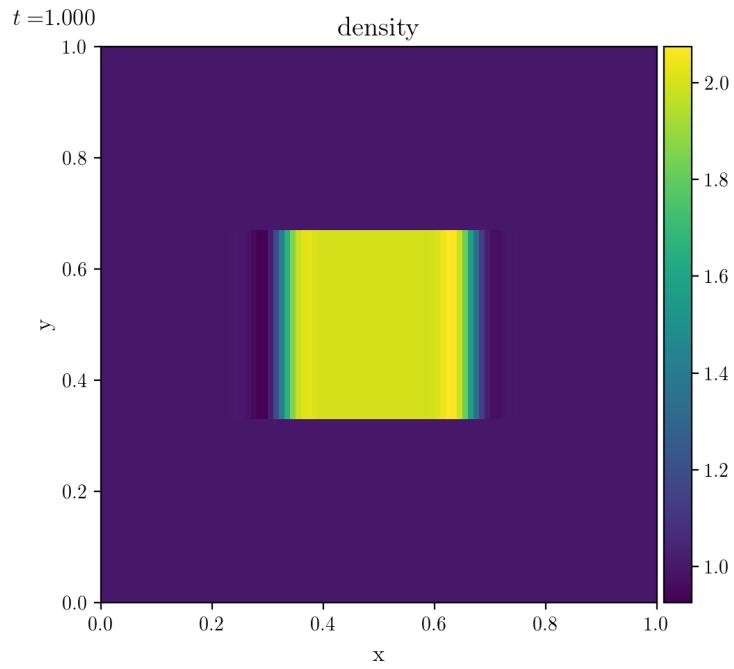


Figure 22: Obtained result 2D velocity in x direction only

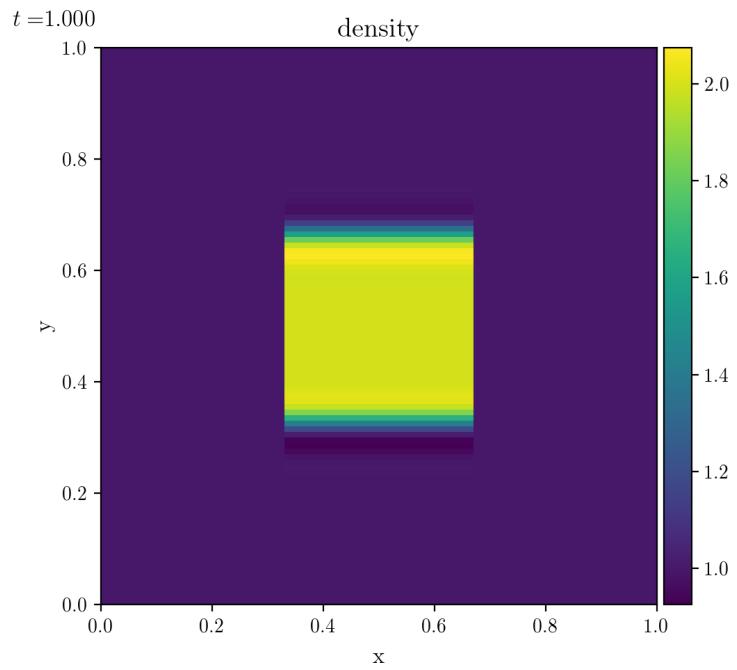


Figure 23: Expected result 2D velocity in y direction only

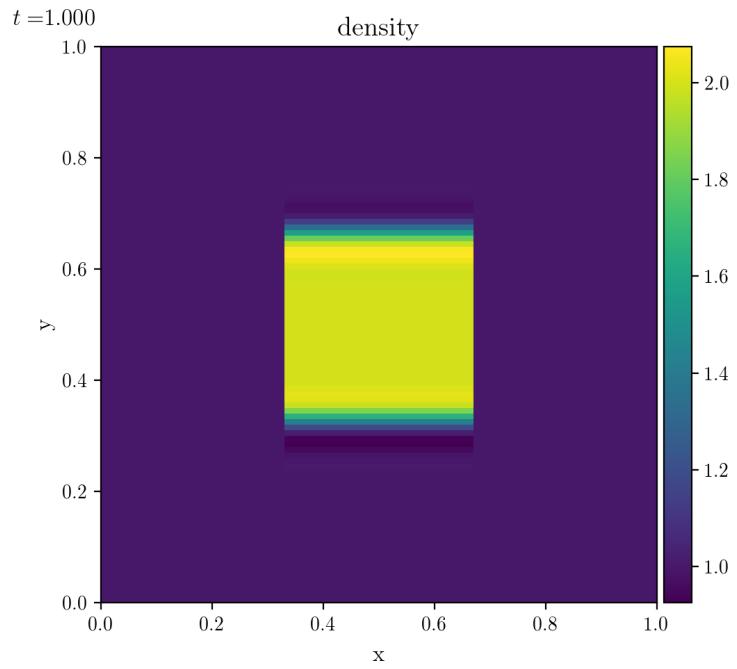


Figure 24: Obtained result 2D velocity in y direction only

1.3 Piecewise Linear with Slope Limiters

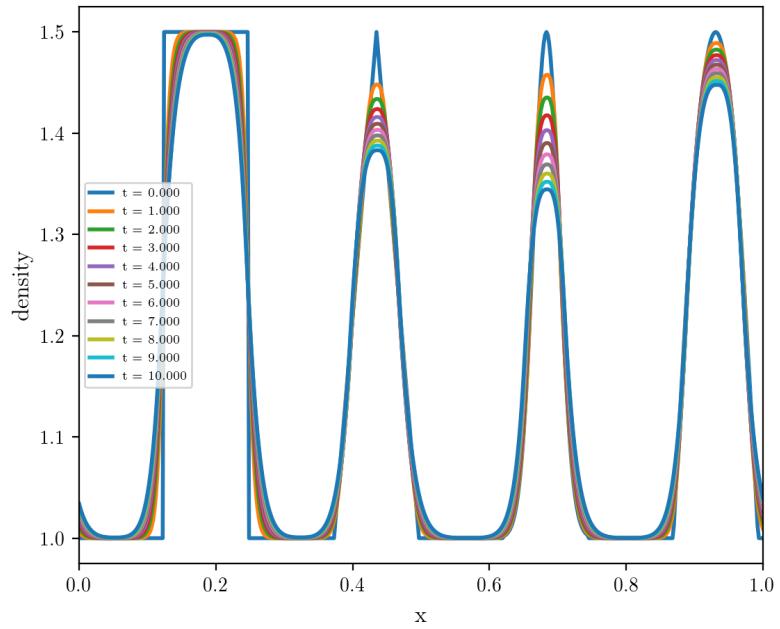


Figure 25: Minmod Slope Limiter. Expected result 1D

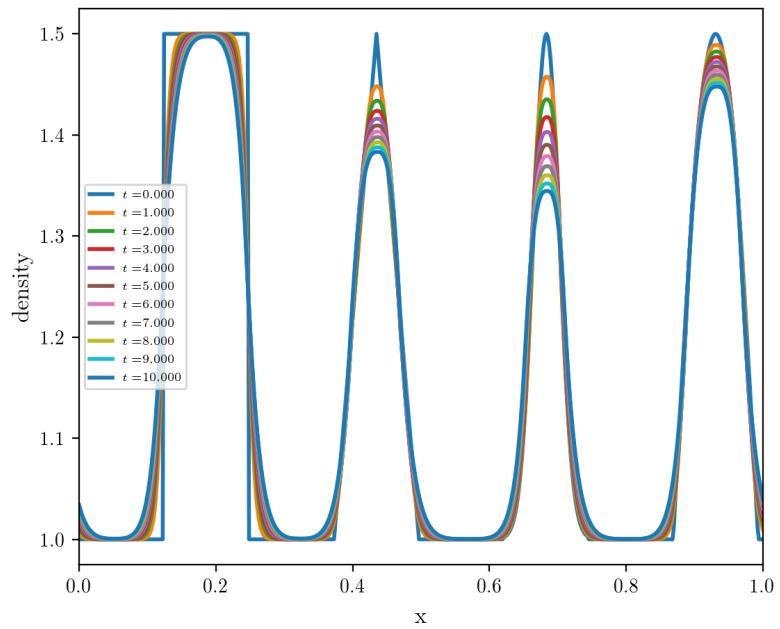


Figure 26: Minmod Slope Limiter. Obtained result 1D

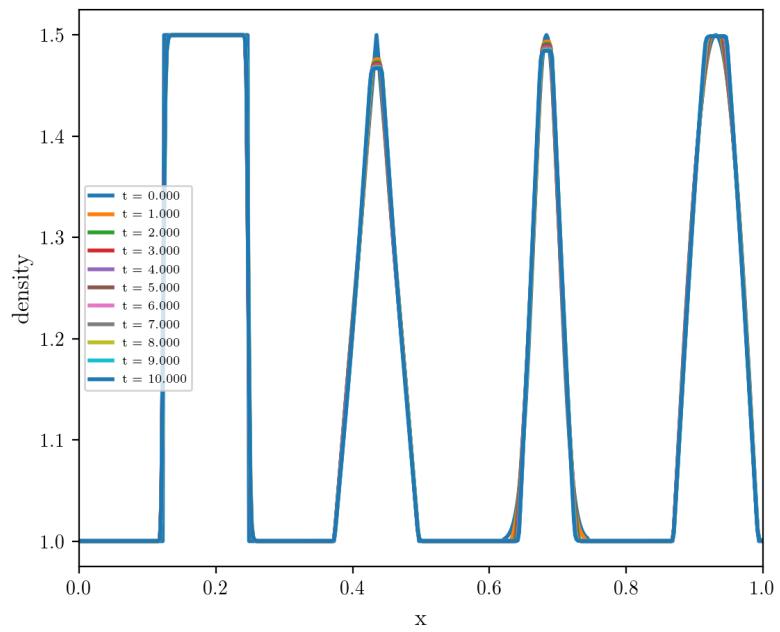


Figure 27: Superbee slope limiter. Expected result 1D negative velocity

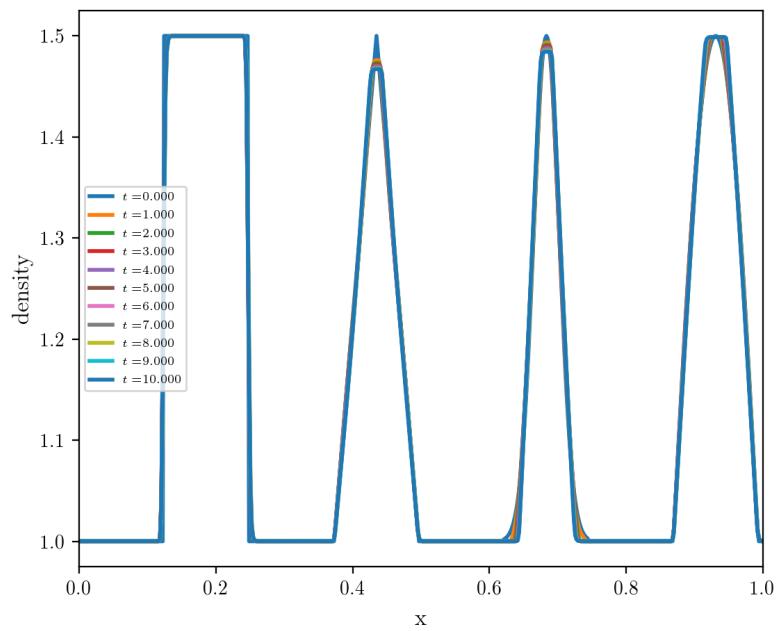


Figure 28: Superbee slope limiter. Obtained result 1D negative velocity

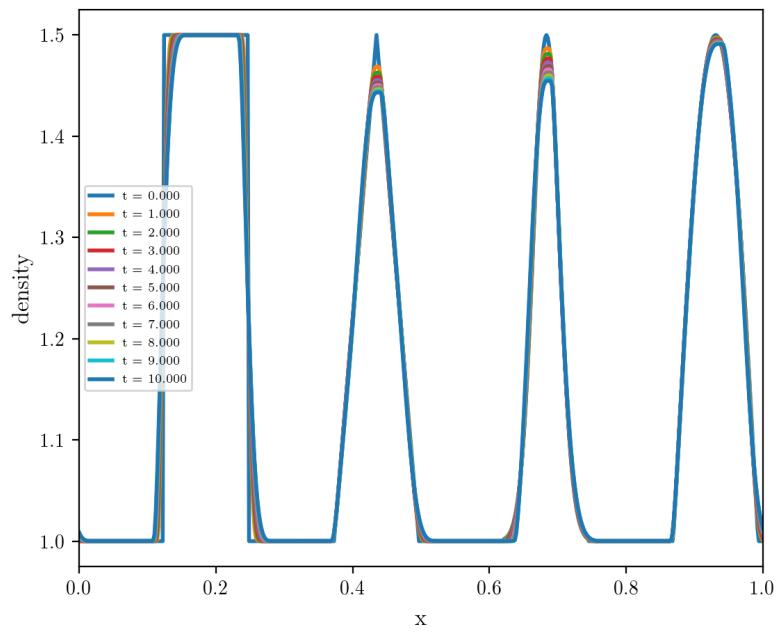


Figure 29: Monotonized central limiter. Expected result 1D

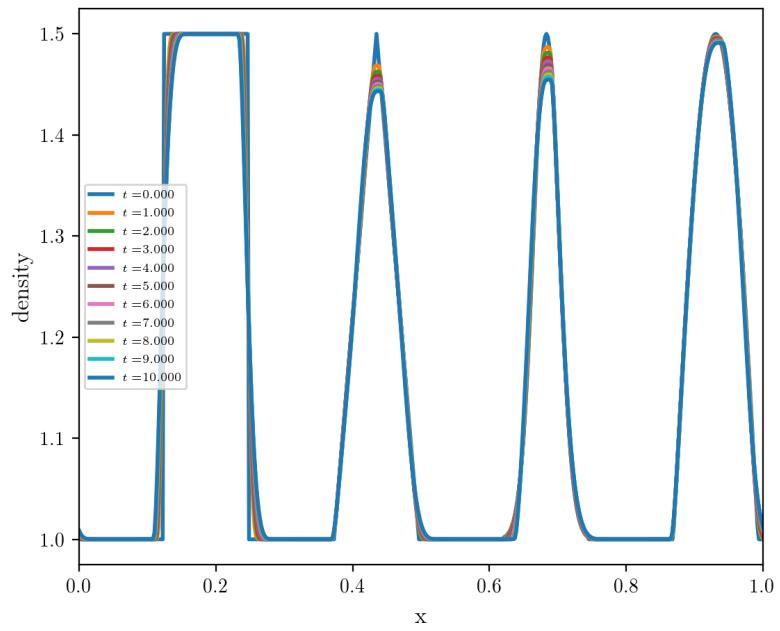


Figure 30: Monotonized central limiter. Obtained result 1D

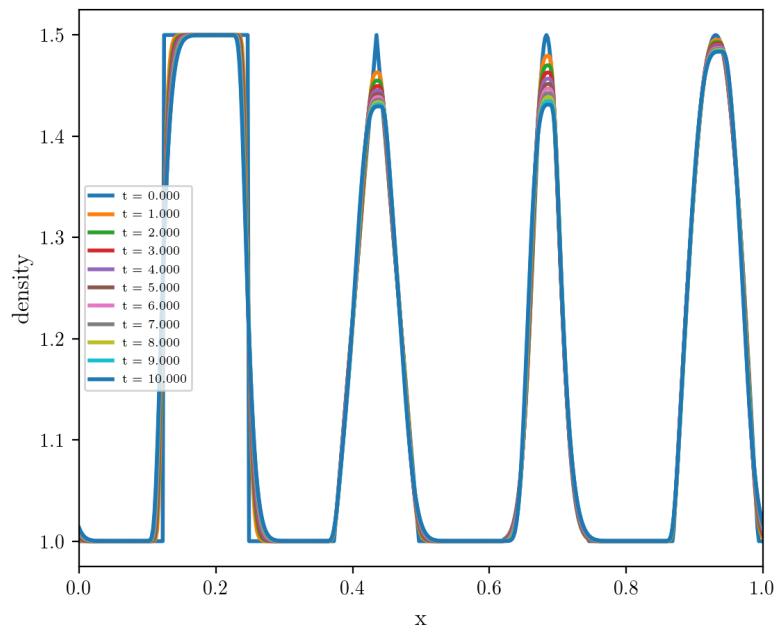


Figure 31: Van Leer Limiter. Expected result 1D

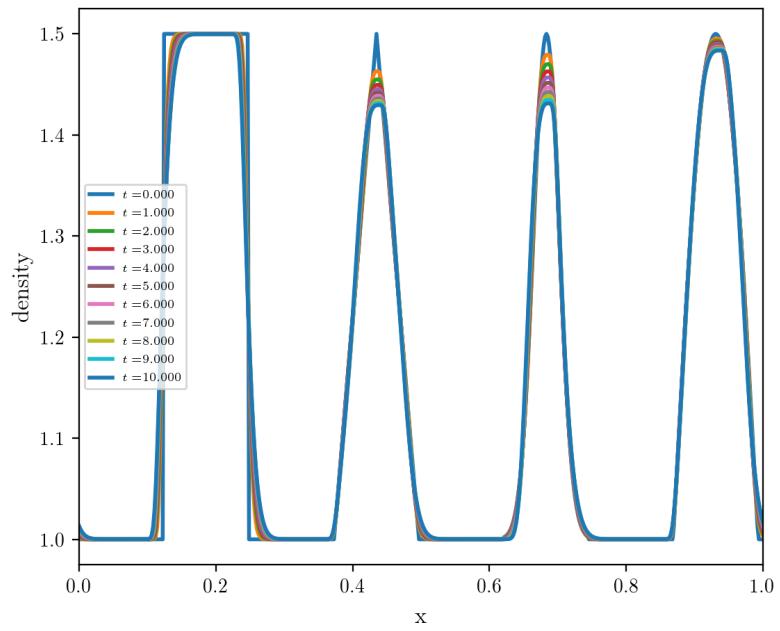


Figure 32: Van Leer Limiter. Obtained result 1D

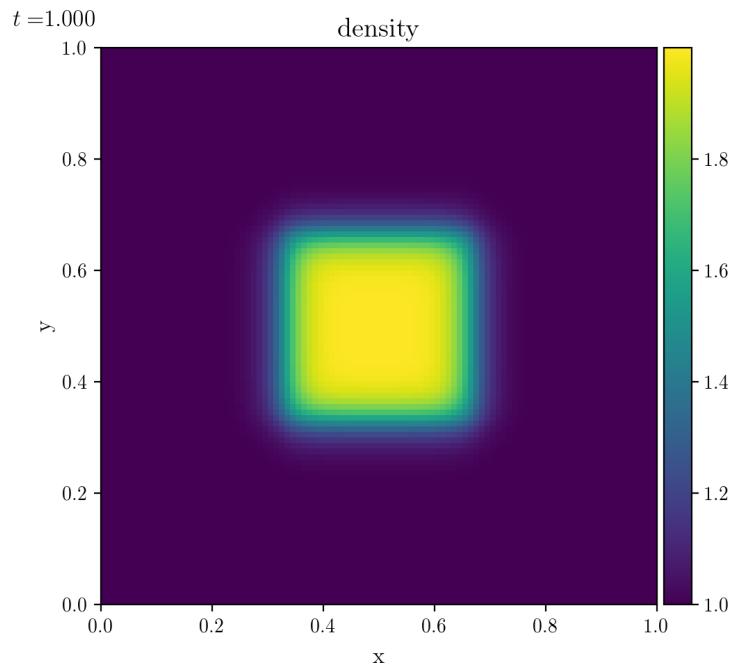


Figure 33: Minmod Slope Limiter. Expected result 2D

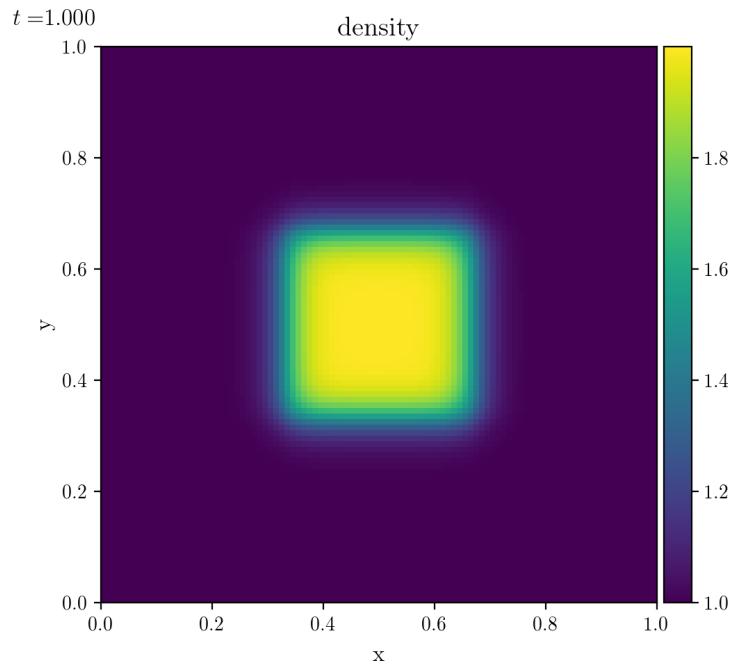


Figure 34: Minmod Slope Limiter. Obtained result 2D

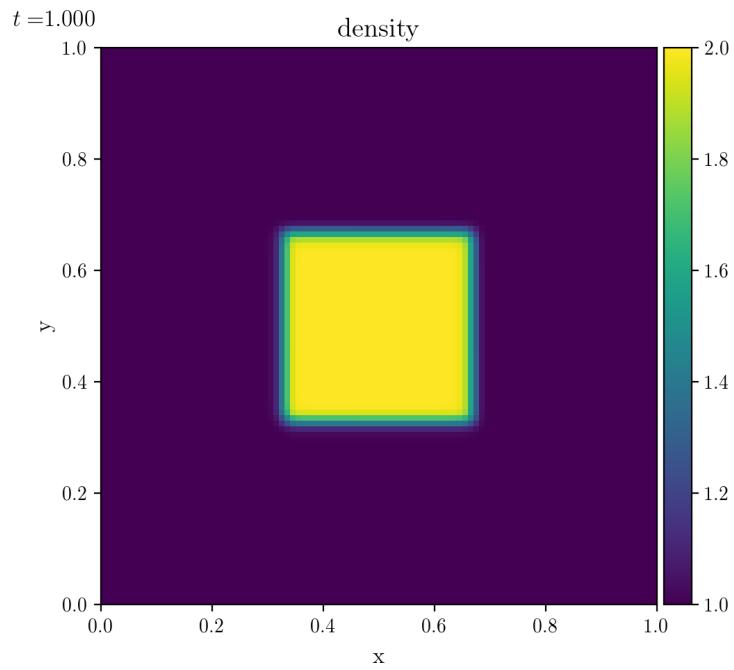


Figure 35: Superbee slope limiter. Expected result 2D negative velocity

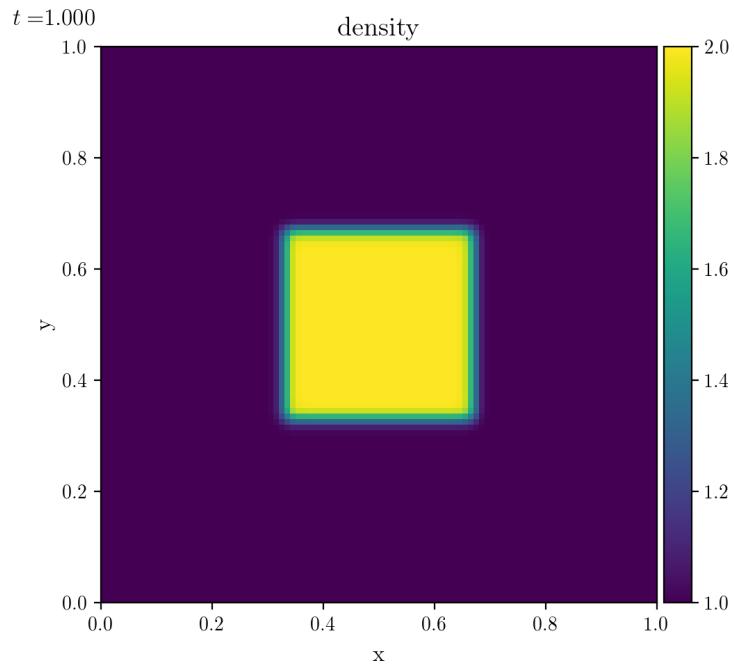


Figure 36: Superbee slope limiter. Obtained result 2D negative velocity

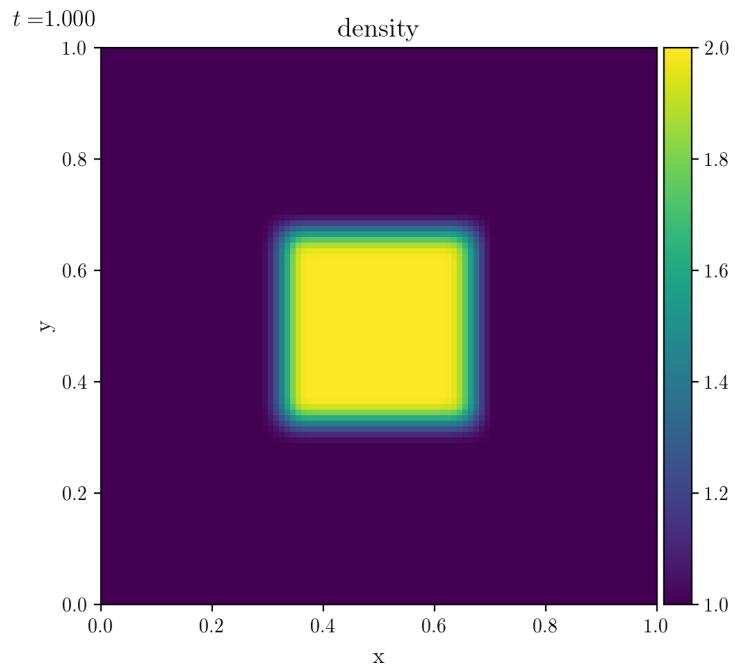


Figure 37: Monotonized central limiter. Expected result 2D

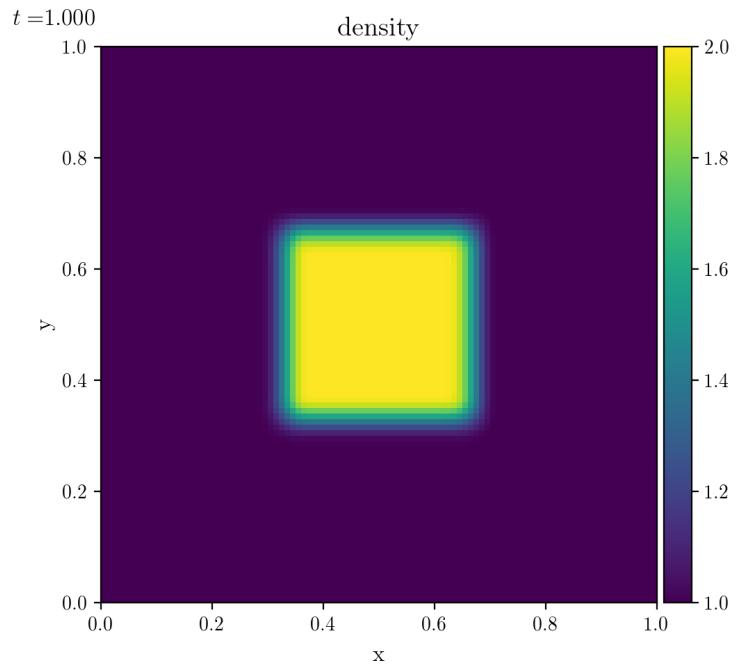


Figure 38: Monotonized central limiter. Obtained result 2D

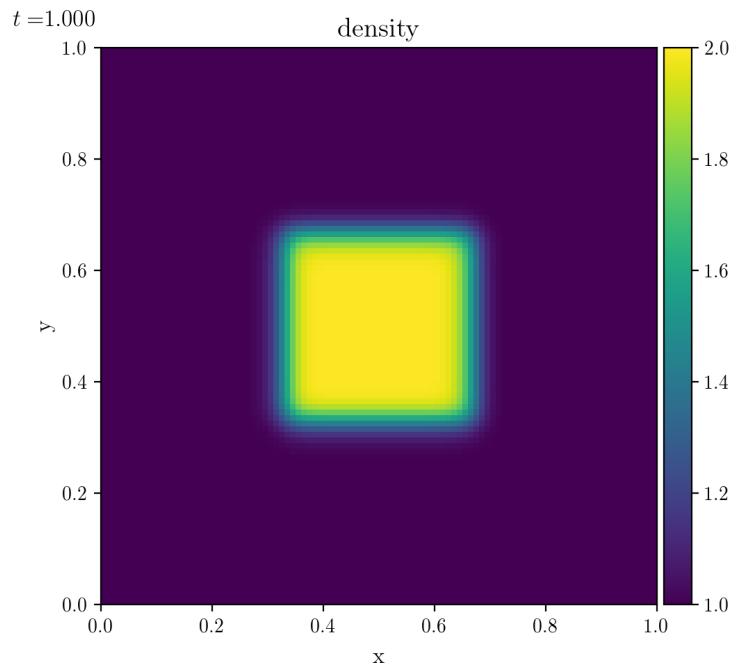


Figure 39: Van Leer Limiter. Expected result 2D

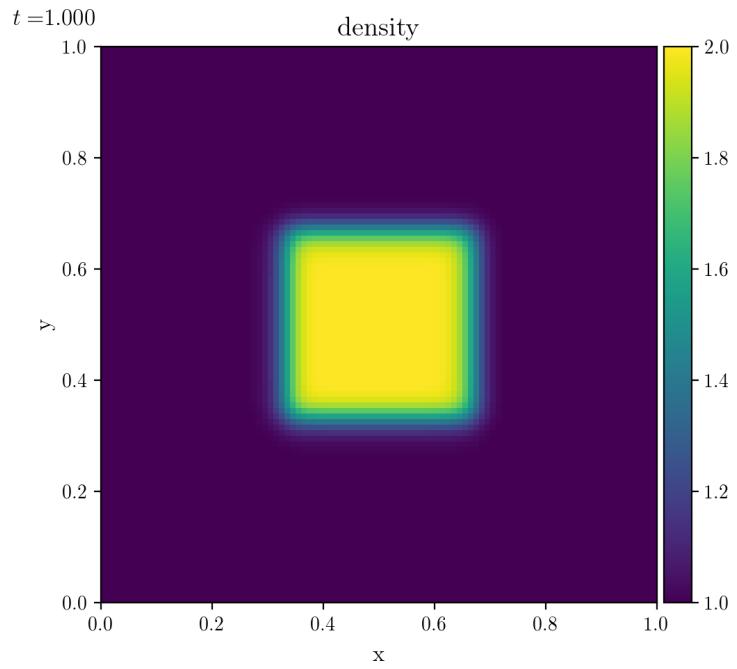


Figure 40: Van Leer Limiter. Obtained result 2D

2 Riemann Solvers

2.1 Exact vs Python

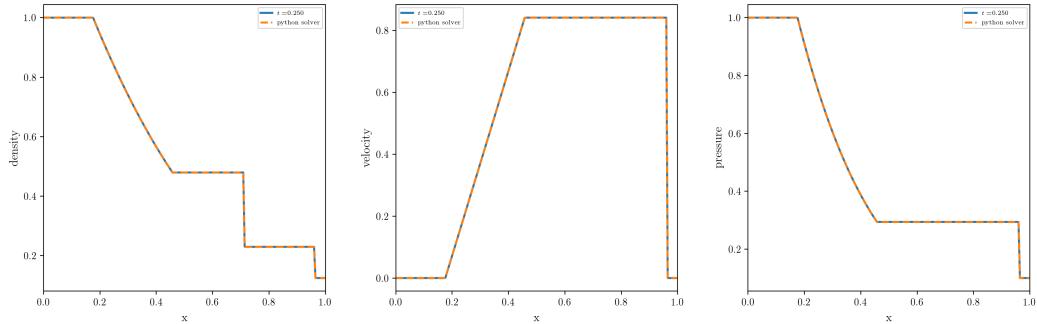


Figure 41: Exact solver for (right facing) sod shock. Expected result.

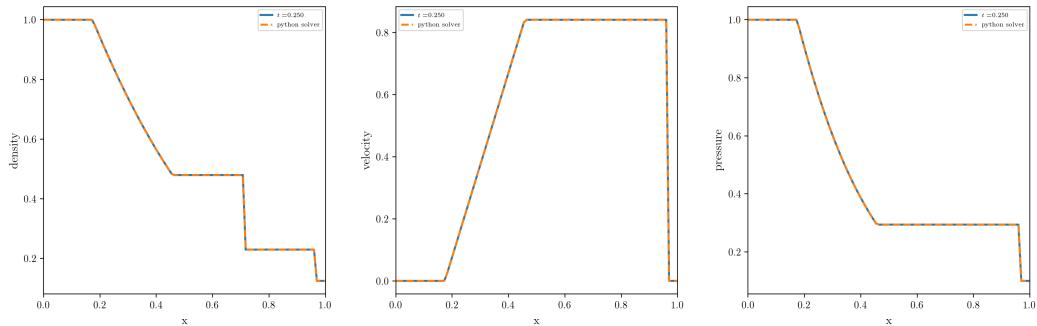


Figure 42: Exact solver for (right facing) sod shock. Obtained result.

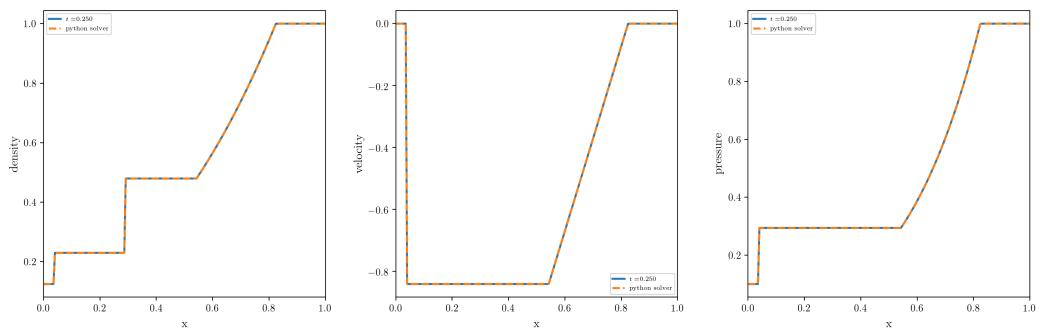


Figure 43: Exact solver for (left facing) sod shock. Expected result.

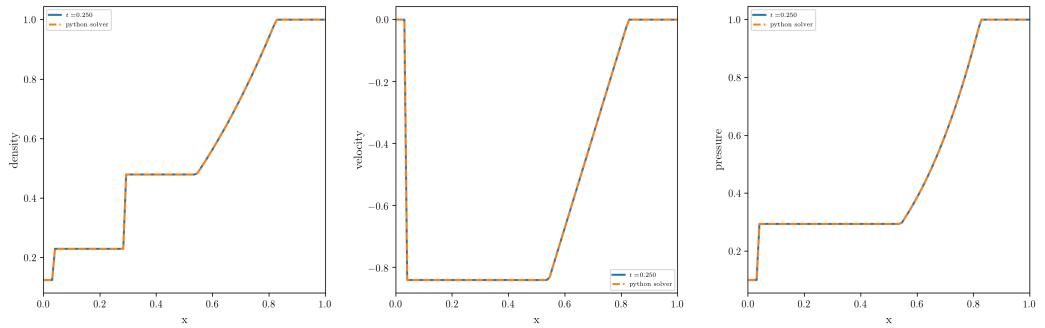


Figure 44: Exact solver for (left facing) sod shock. Obtained result.

2.2 Vacuum

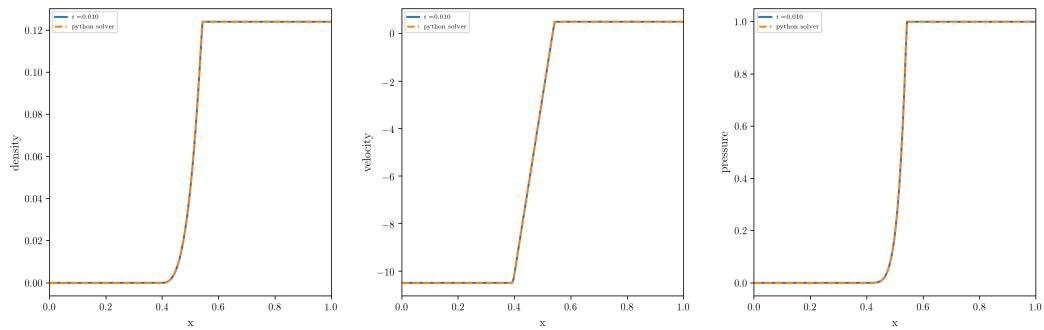


Figure 45: Exact solver for left vacuum state. Expected result.

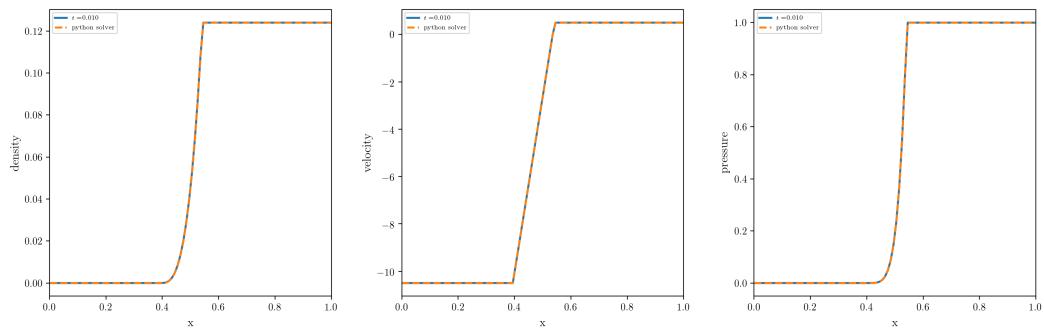


Figure 46: Exact solver for left vacuum state. Obtained result.

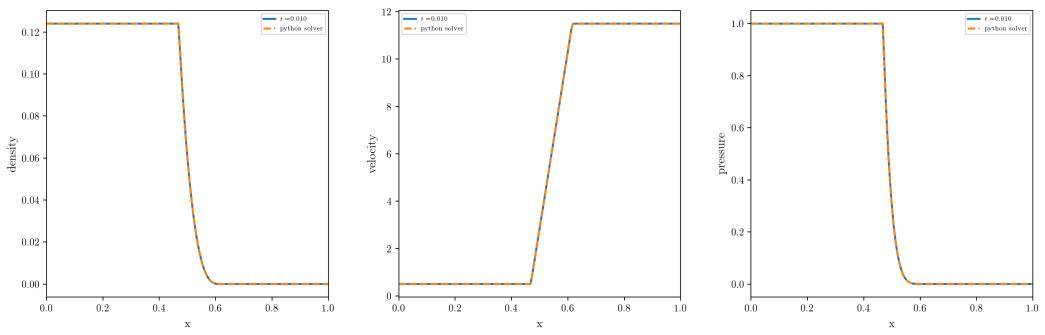


Figure 47: Exact solver for left vacuum state. Expected result.

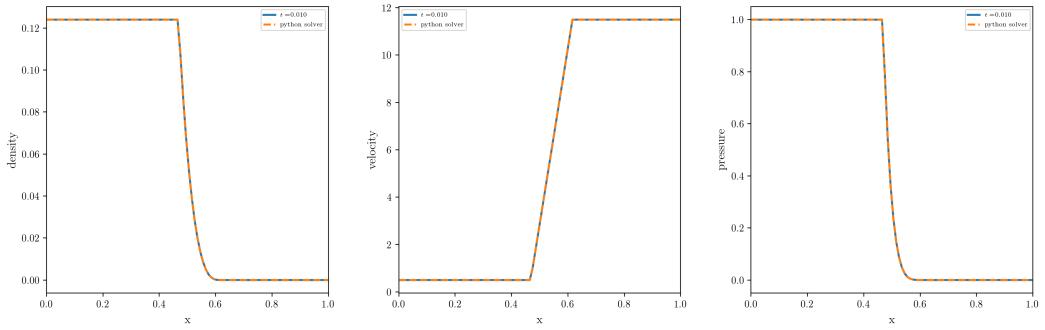


Figure 48: Exact solver for left vacuum state. Obtained result.

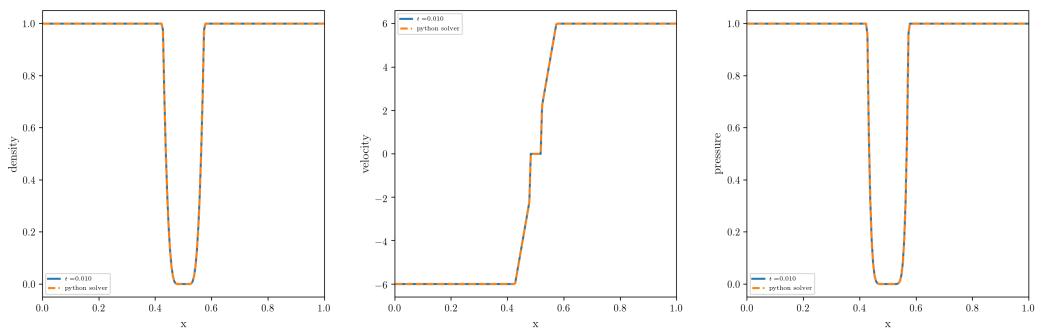


Figure 49: Exact solver for vacuum generating conditions. Expected result.

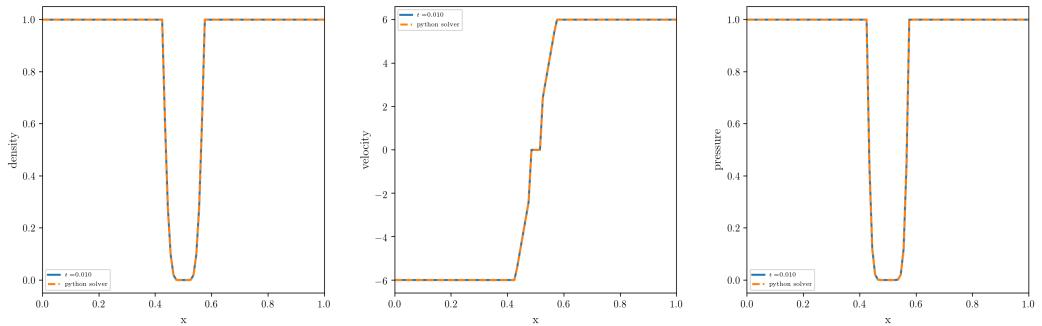


Figure 50: Exact solver for vacuum generating conditions. Obtained result.

3 Godunov's Method

3.1 1D with different Riemann Solvers

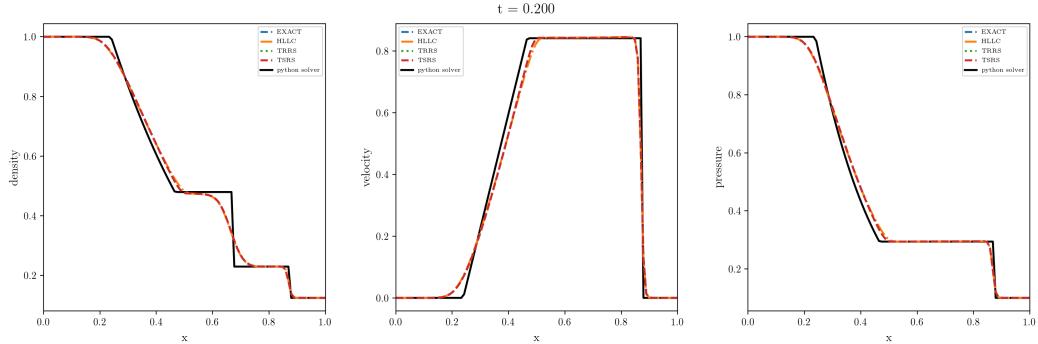


Figure 51: Godunov's method for (right facing) sod shock. Expected result.

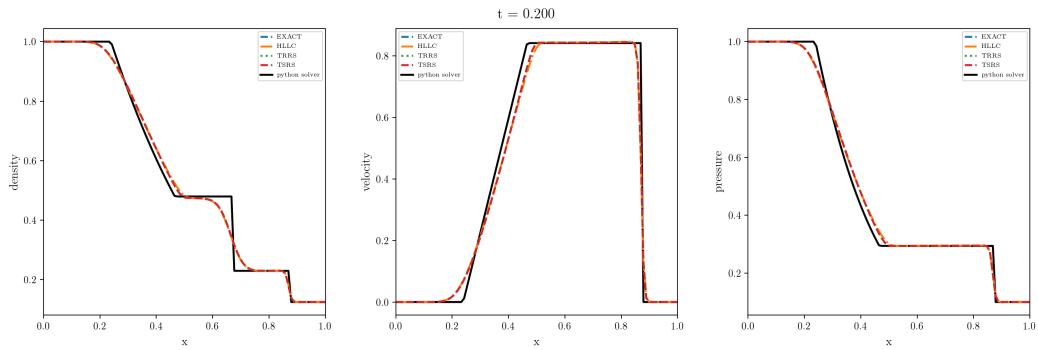


Figure 52: Godunov's method for (right facing) sod shock. Obtained result.

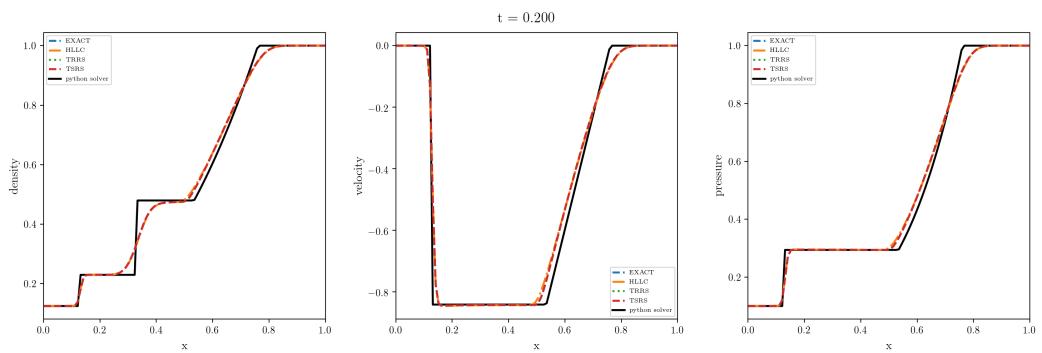


Figure 53: Godunov's method for (left facing) sod shock. Expected result.

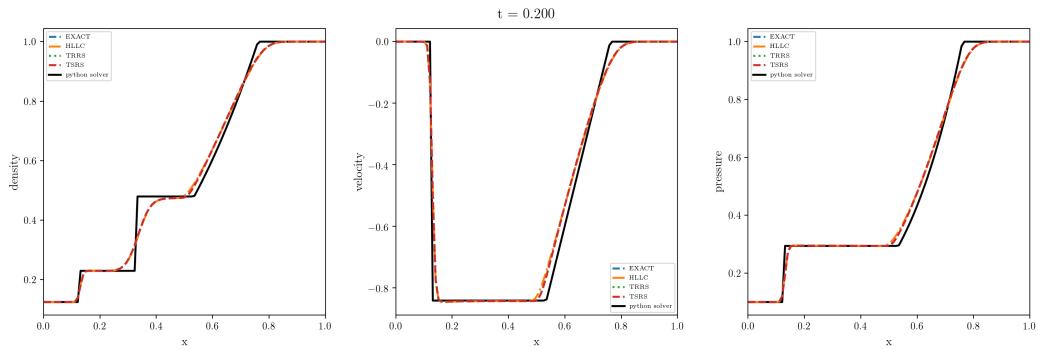


Figure 54: Godunov's method for (left facing) sod shock. Obtained result.

3.2 Vacuum in 1D

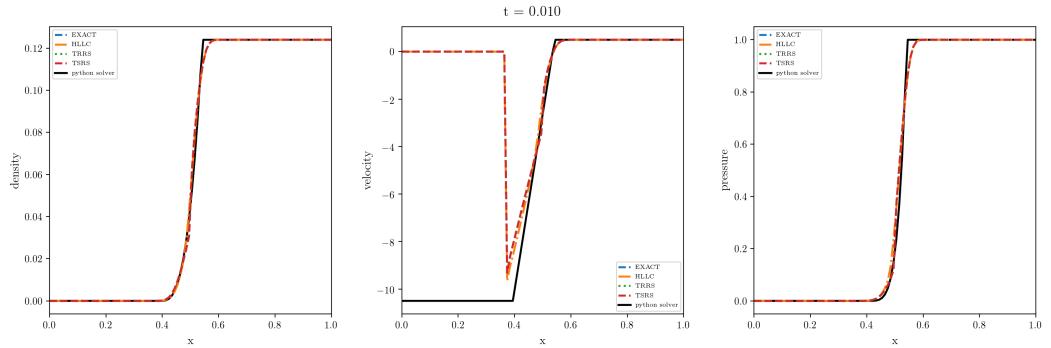


Figure 55: Godunov's method for left vacuum state. Expected result.

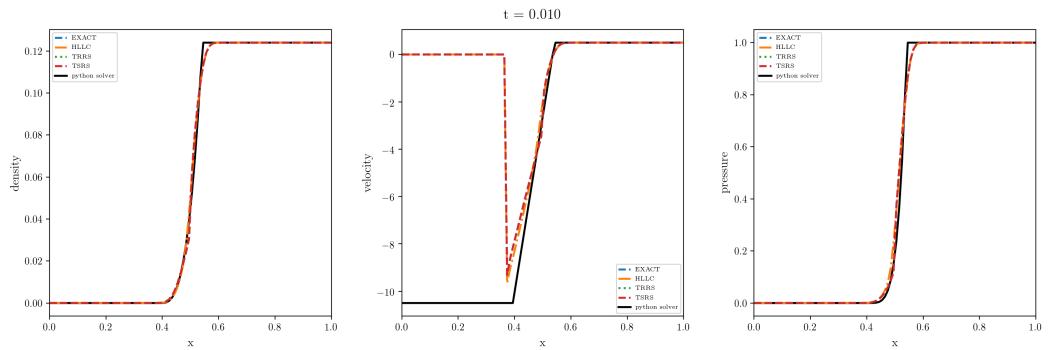


Figure 56: Godunov's method for left vacuum state. Obtained result.

3.3 2D with different Riemann Solvers

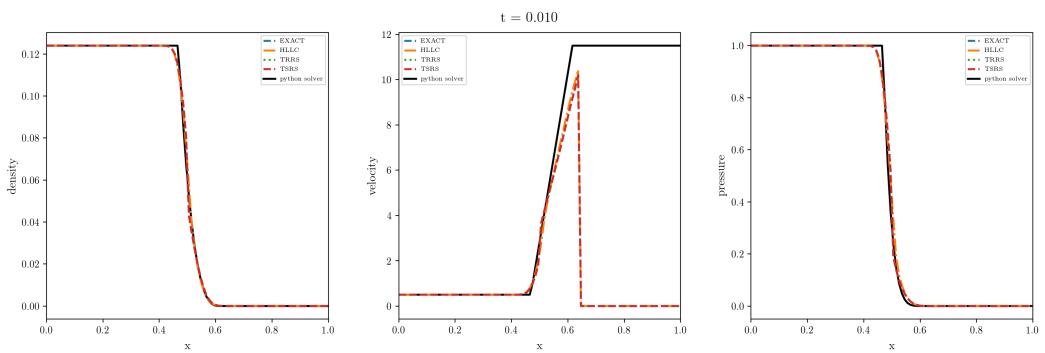


Figure 57: Godunov's method for left vacuum state. Expected result.

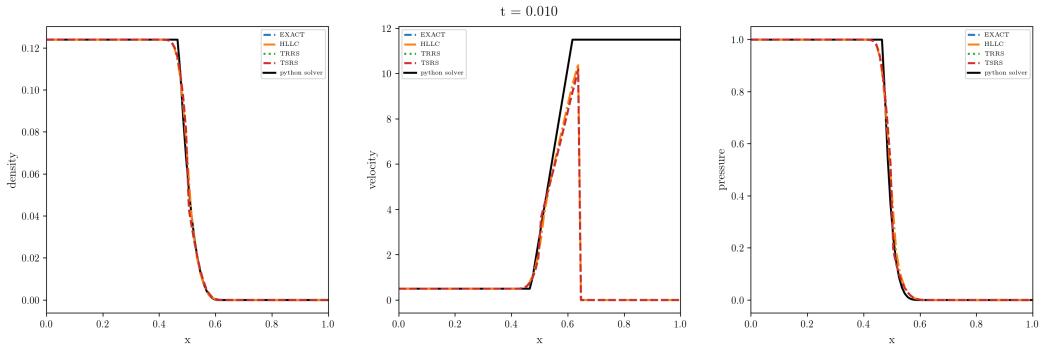


Figure 58: Godunov's method for left vacuum state. Obtained result.

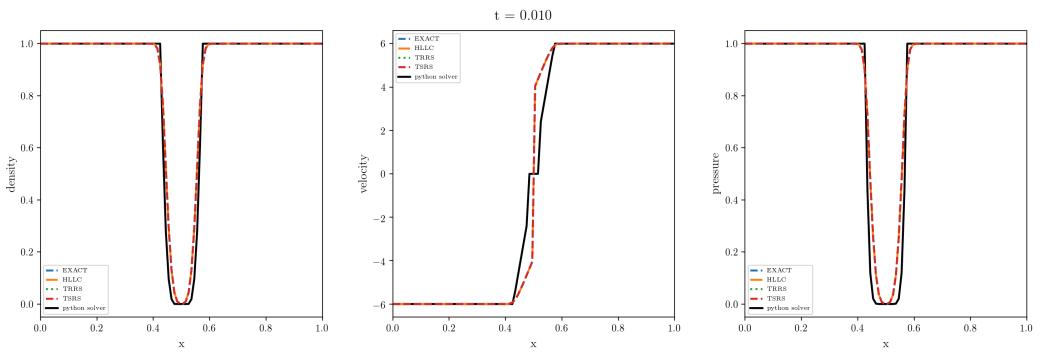


Figure 59: Godunov's method for vacuum generating conditions. Expected result.

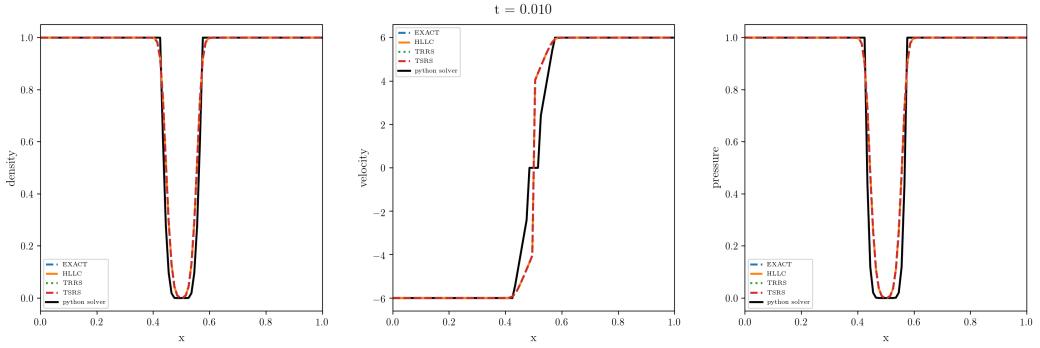


Figure 60: Godunov's method for vacuum generating conditions. Obtained result.

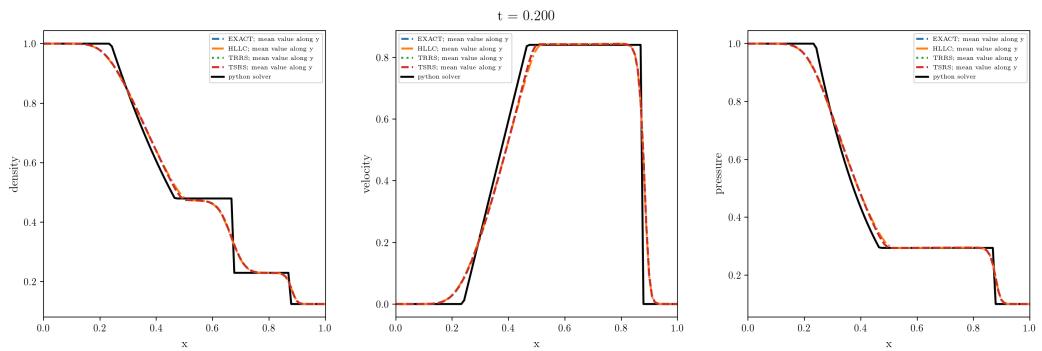


Figure 61: Godunov's method for (right facing) sod shock. Expected result.

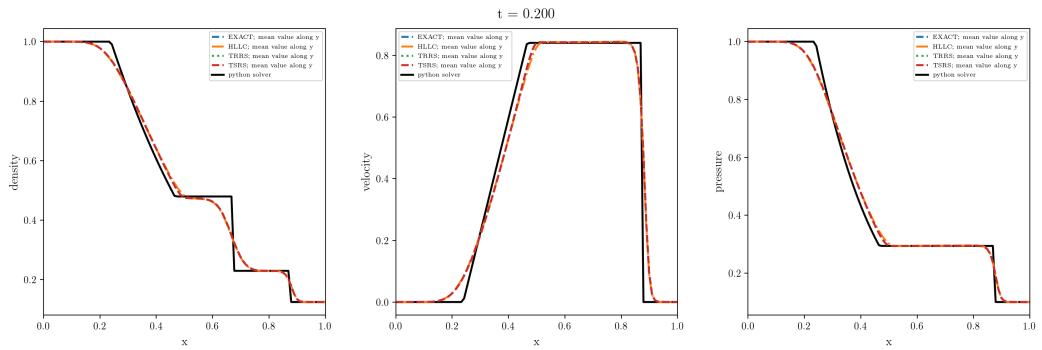


Figure 62: Godunov's method for (right facing) sod shock. Obtained result.

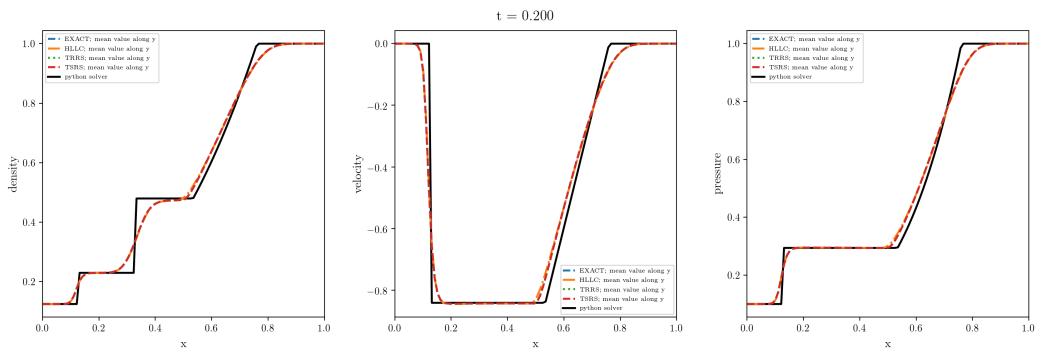


Figure 63: Godunov's method for (left facing) sod shock. Expected result.

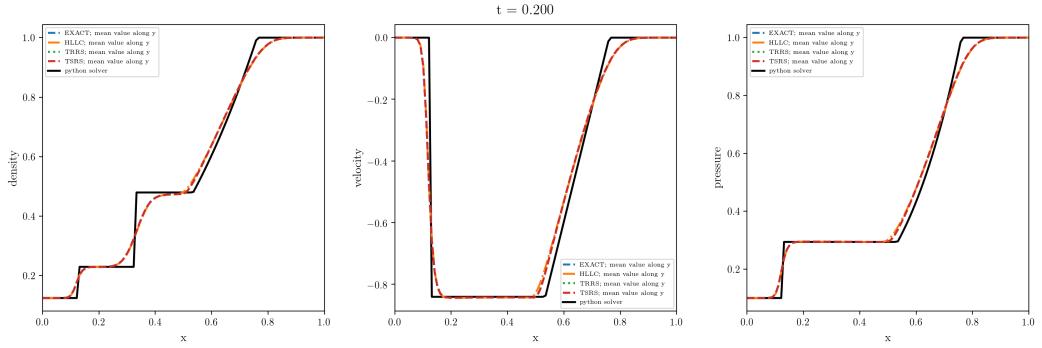


Figure 64: Godunov's method for (left facing) sod shock. Obtained result.

3.4 Vacuum in 2D

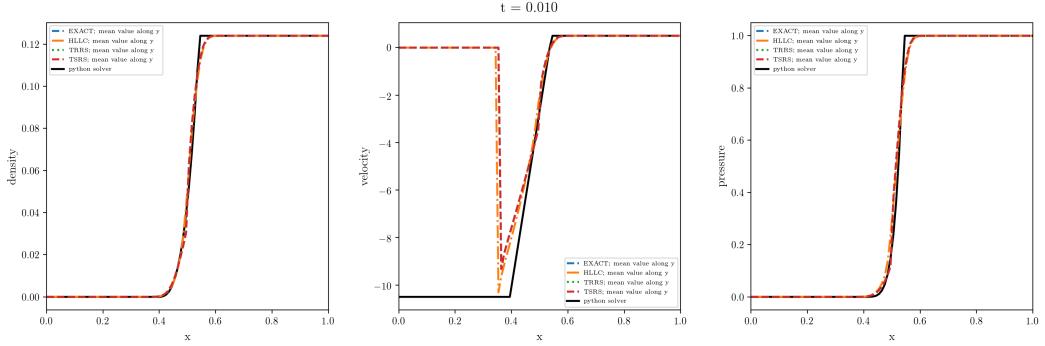


Figure 65: Godunov's method for left vacuum state. Expected result.

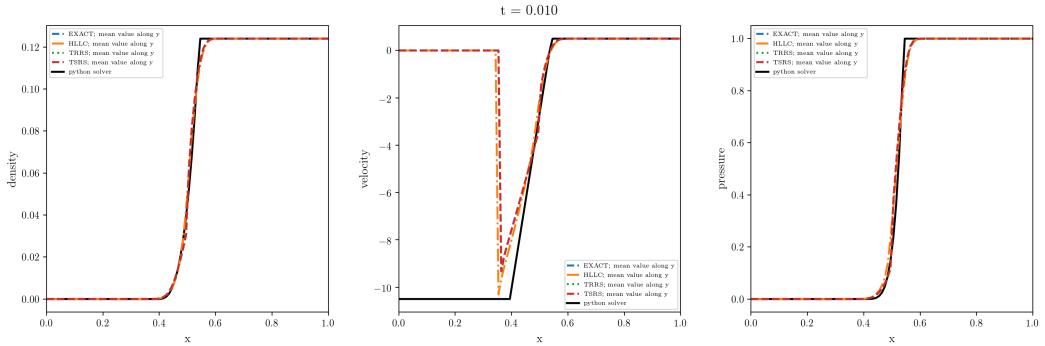


Figure 66: Godunov's method for left vacuum state. Obtained result.

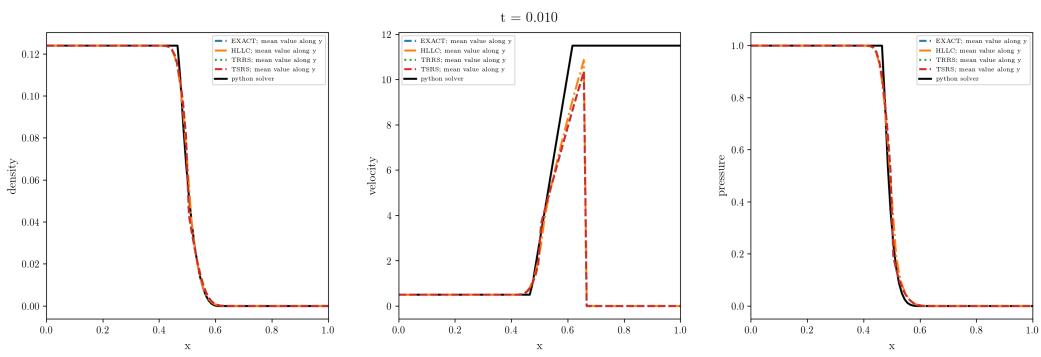


Figure 67: Godunov's method for left vacuum state. Expected result.

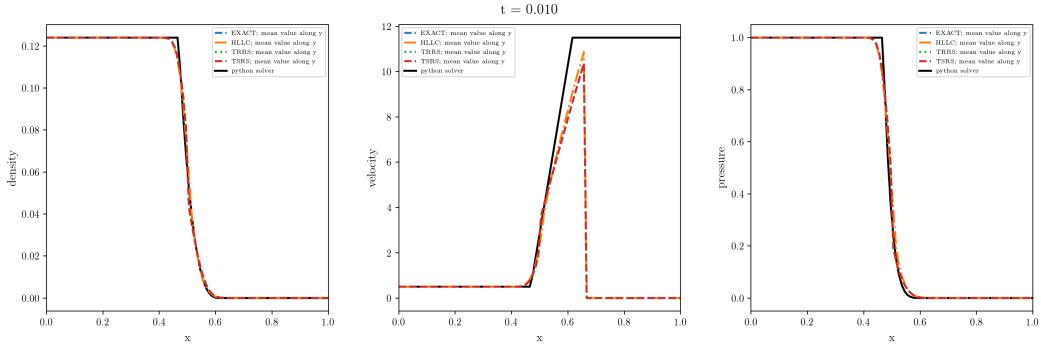


Figure 68: Godunov's method for left vacuum state. Obtained result.

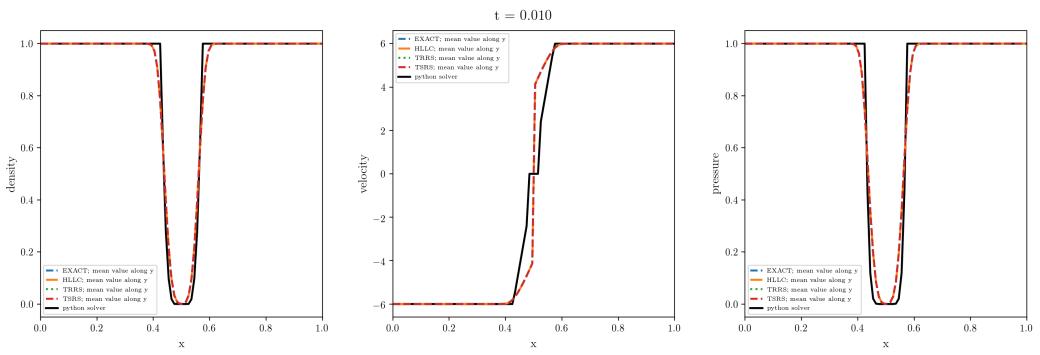


Figure 69: Godunov's method for vacuum generating conditions. Expected result.

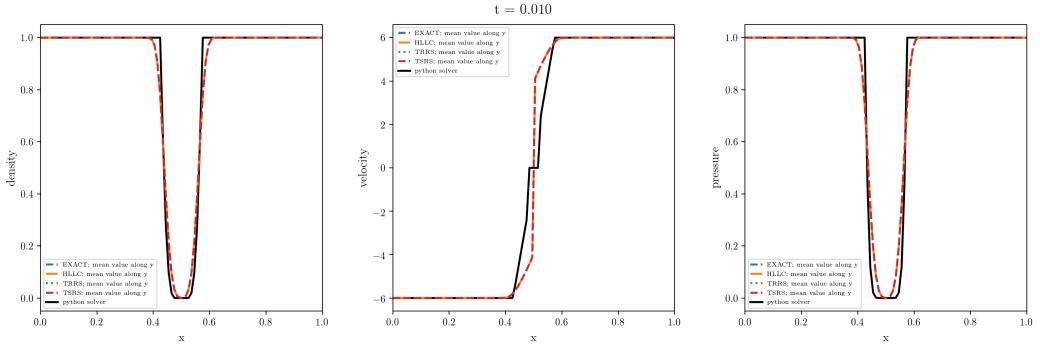


Figure 70: Godunov's method for vacuum generating conditions. Obtained result.

3.5 Others in 2D

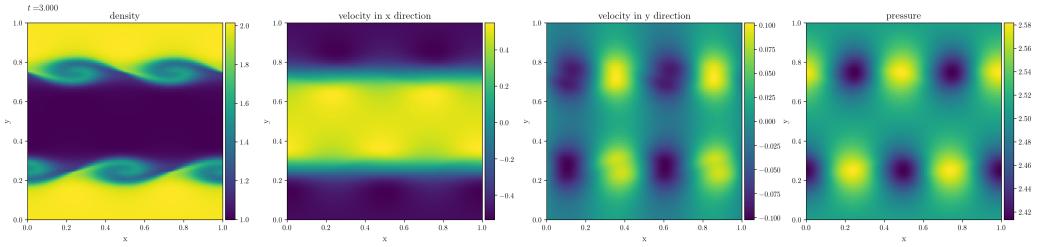


Figure 71: Godunov's method for Kelvin Helmholtz instability. Expected result.

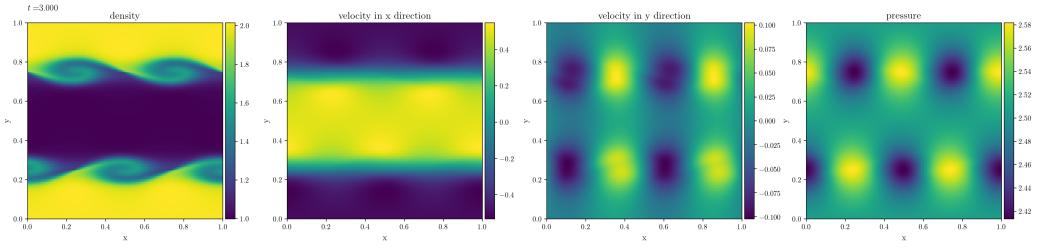


Figure 72: Godunov's method for Kelvin Helmholtz instability. Obtained result.