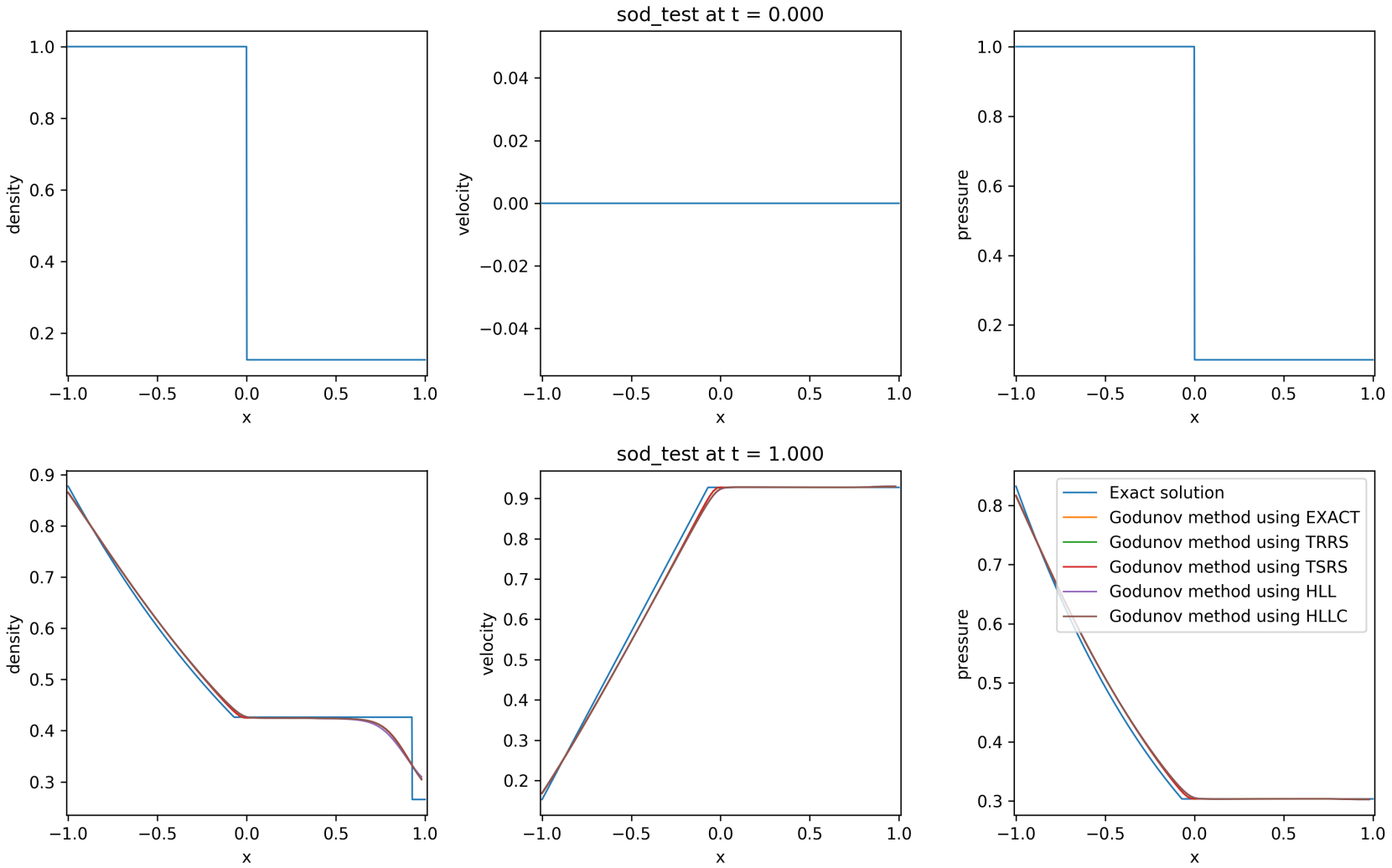
Solutions to Riemann Problems using Godunov's Method and Approximate Riemann Solvers

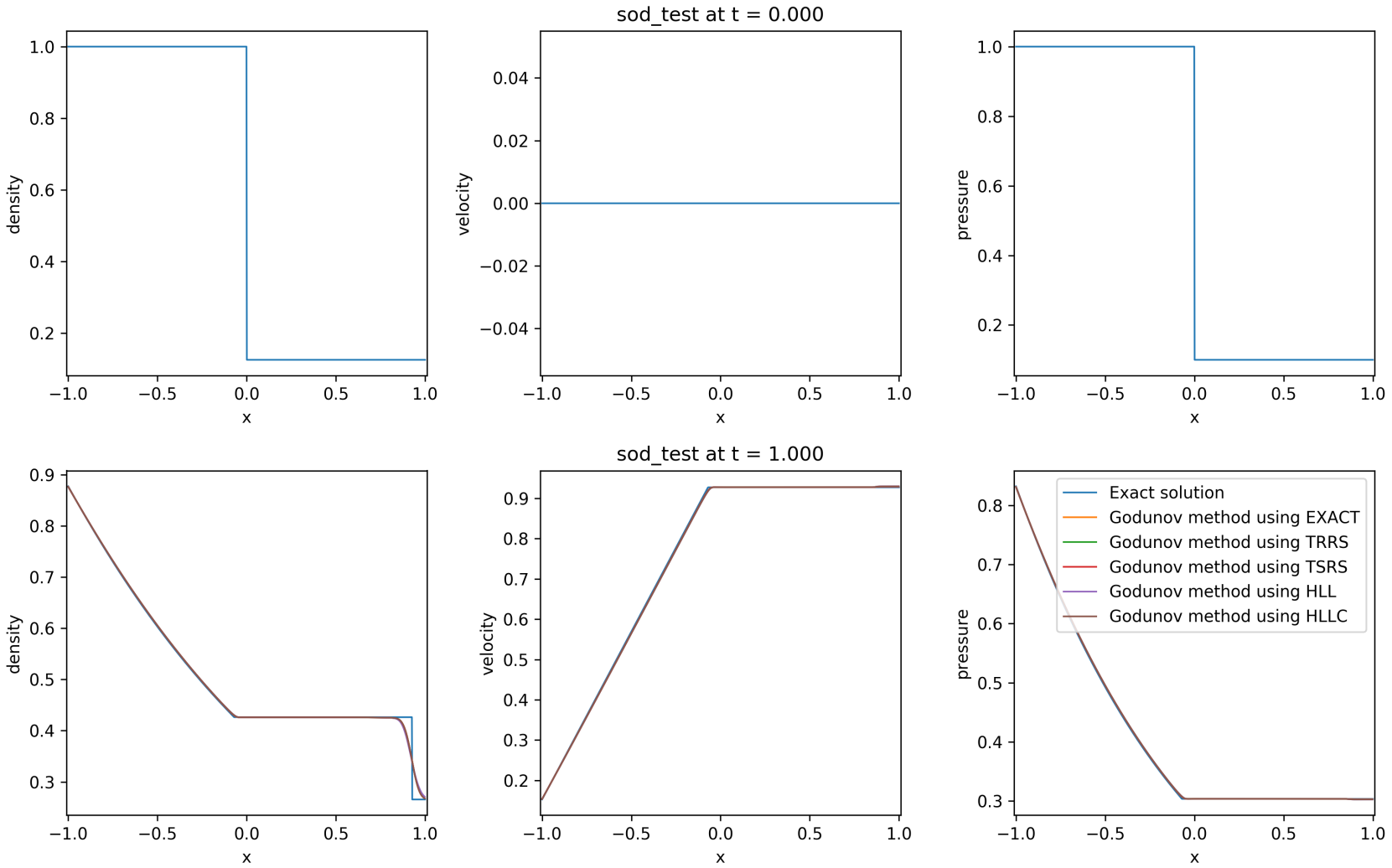
Mladen Ivkovic

February 2019

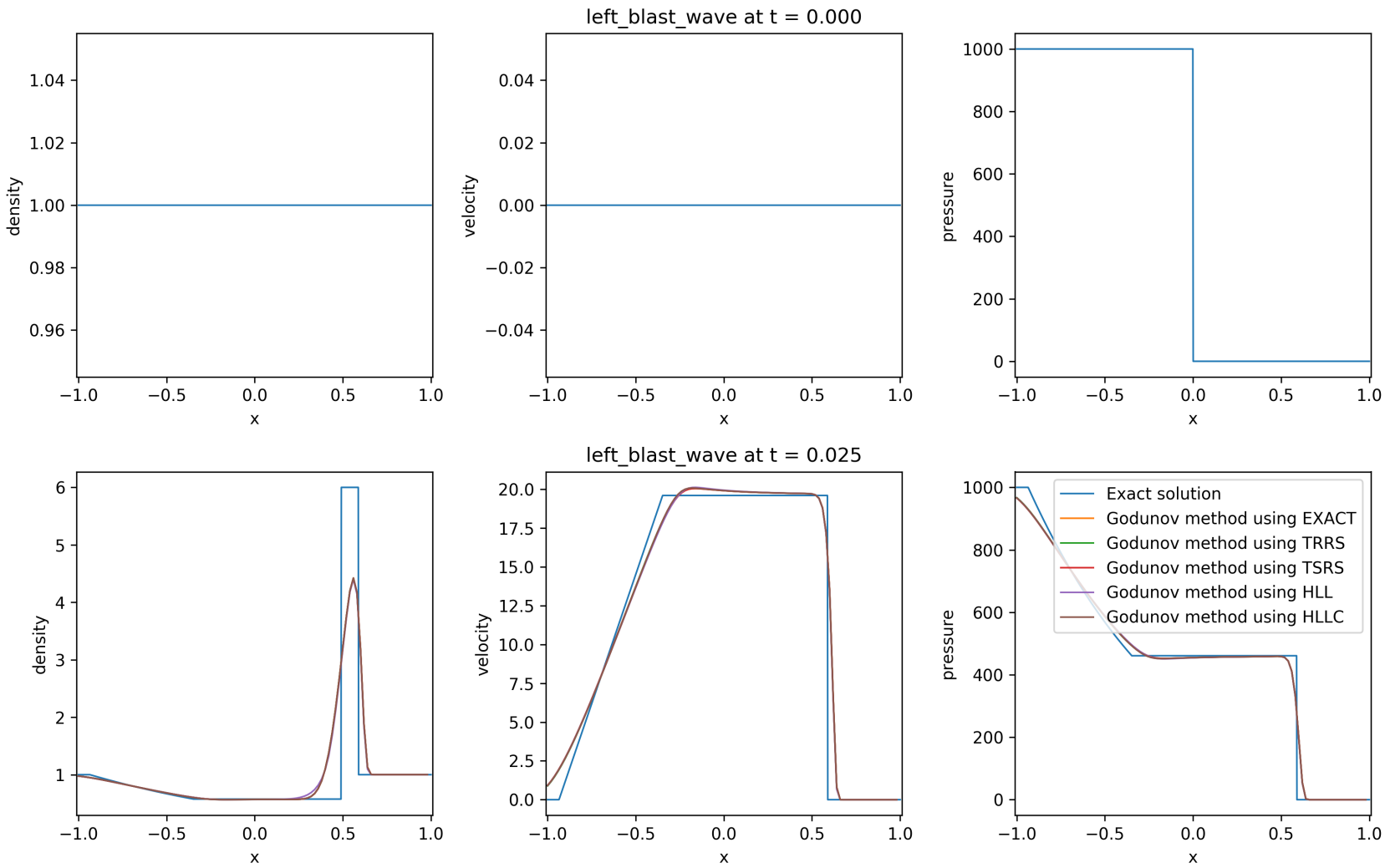
$nx = 100$


sod_test at t = 0.000
density
velocity
pressure
x
sod_test at t = 1.000
Exact solution
Godunov method using EXACT
Godunov method using TRRS
Godunov method using TSRS
Godunov method using HLL
Godunov method using HLLC

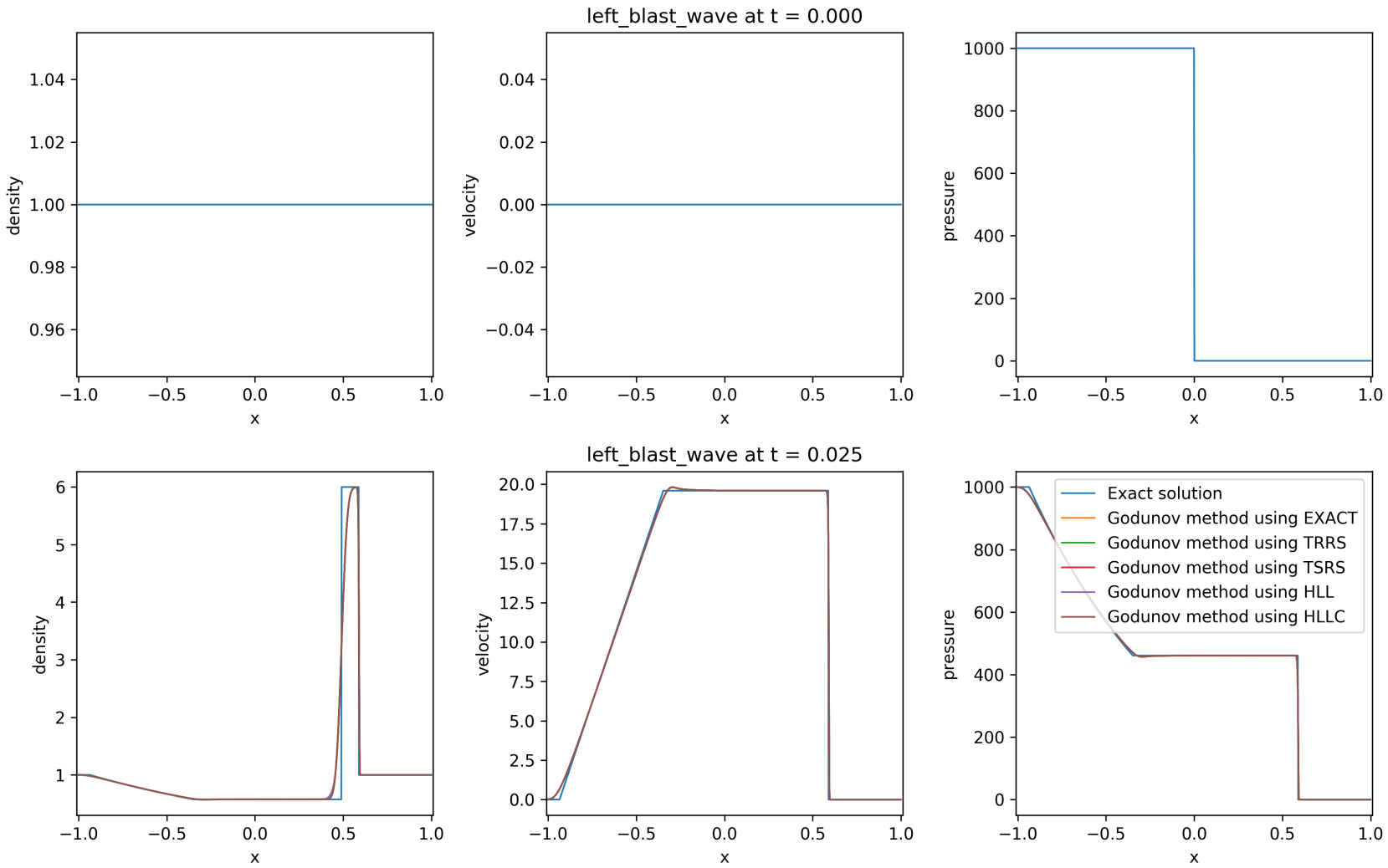
$nx = 1000$


sod_test at t = 0.000
density
velocity
pressure
x
sod_test at t = 1.000
density
velocity
pressure
x
Exact solution
Godunov method using EXACT
Godunov method using TRRS
Godunov method using TSRS
Godunov method using HLL
Godunov method using HLLC

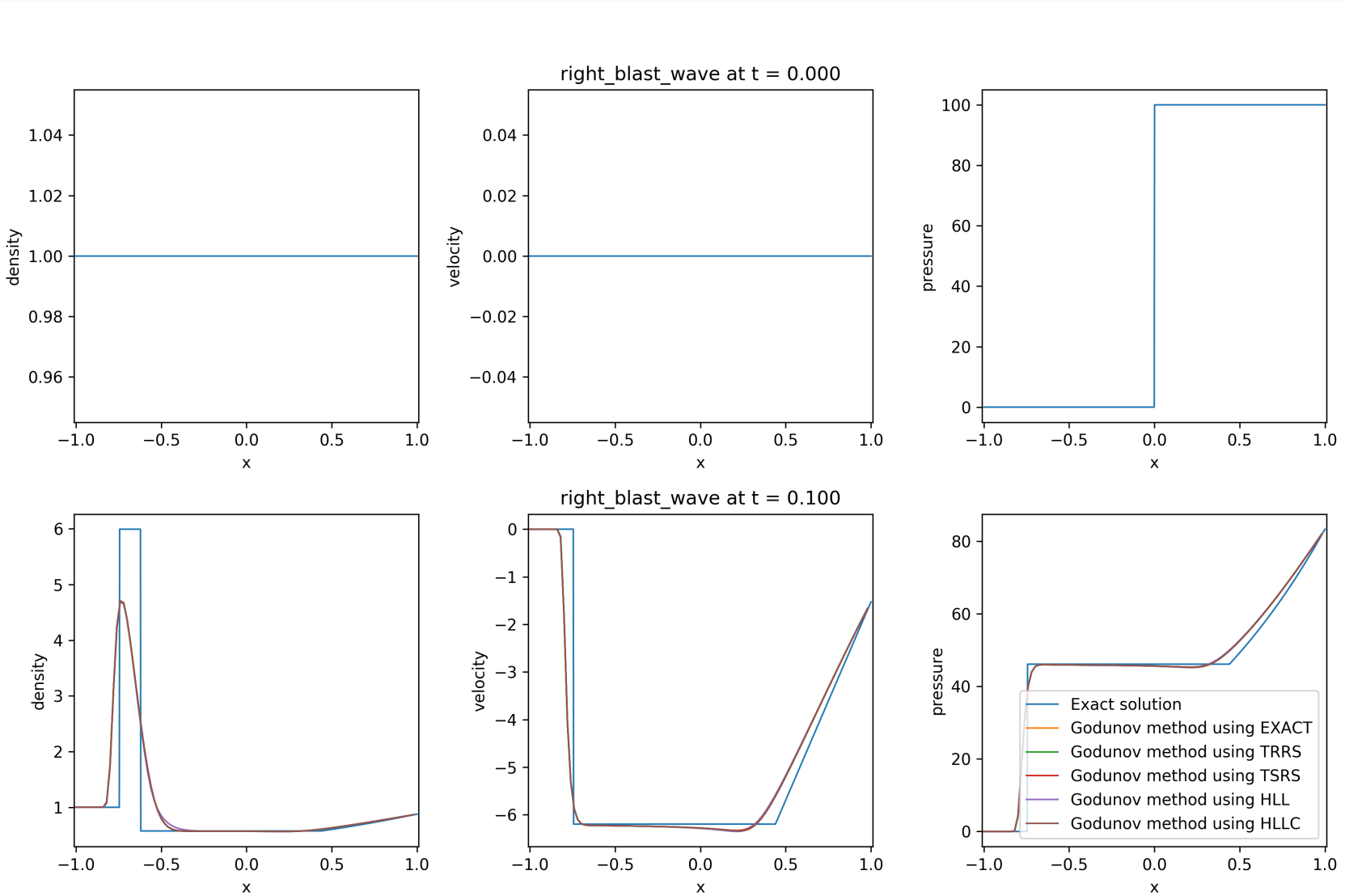
$nx = 100$


left_blast_wave at t = 0.000
density
velocity
pressure
x
left_blast_wave at t = 0.025
density
velocity
pressure
x
Exact solution
Godunov method using EXACT
Godunov method using TRRS
Godunov method using TSRS
Godunov method using HLL
Godunov method using HLLC

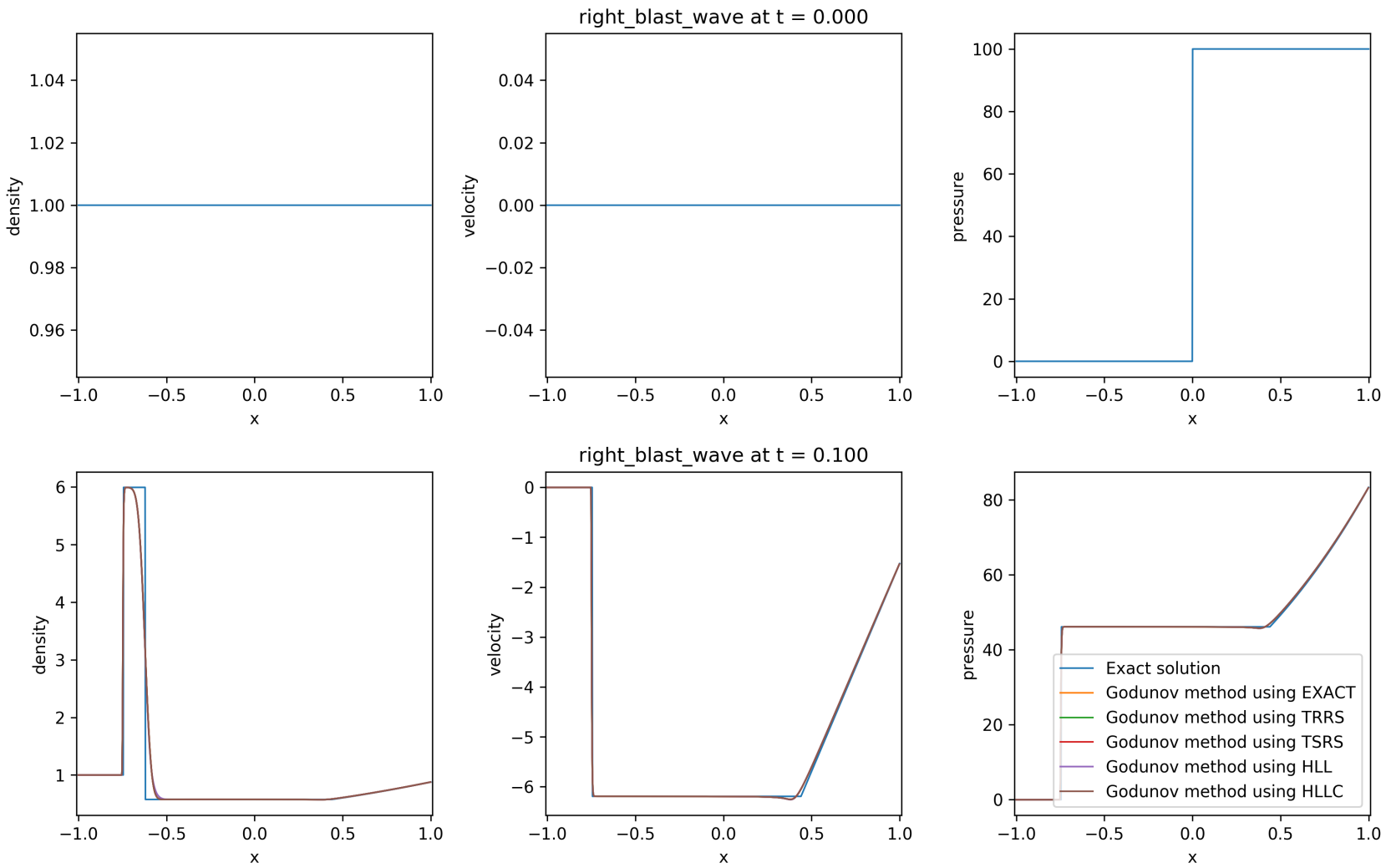
$nx = 1000$


left_blast_wave at t = 0.000
density
velocity
pressure
x
left_blast_wave at t = 0.025
density
velocity
pressure
x
Exact solution
Godunov method using EXACT
Godunov method using TRRS
Godunov method using TSRS
Godunov method using HLL
Godunov method using HLLC

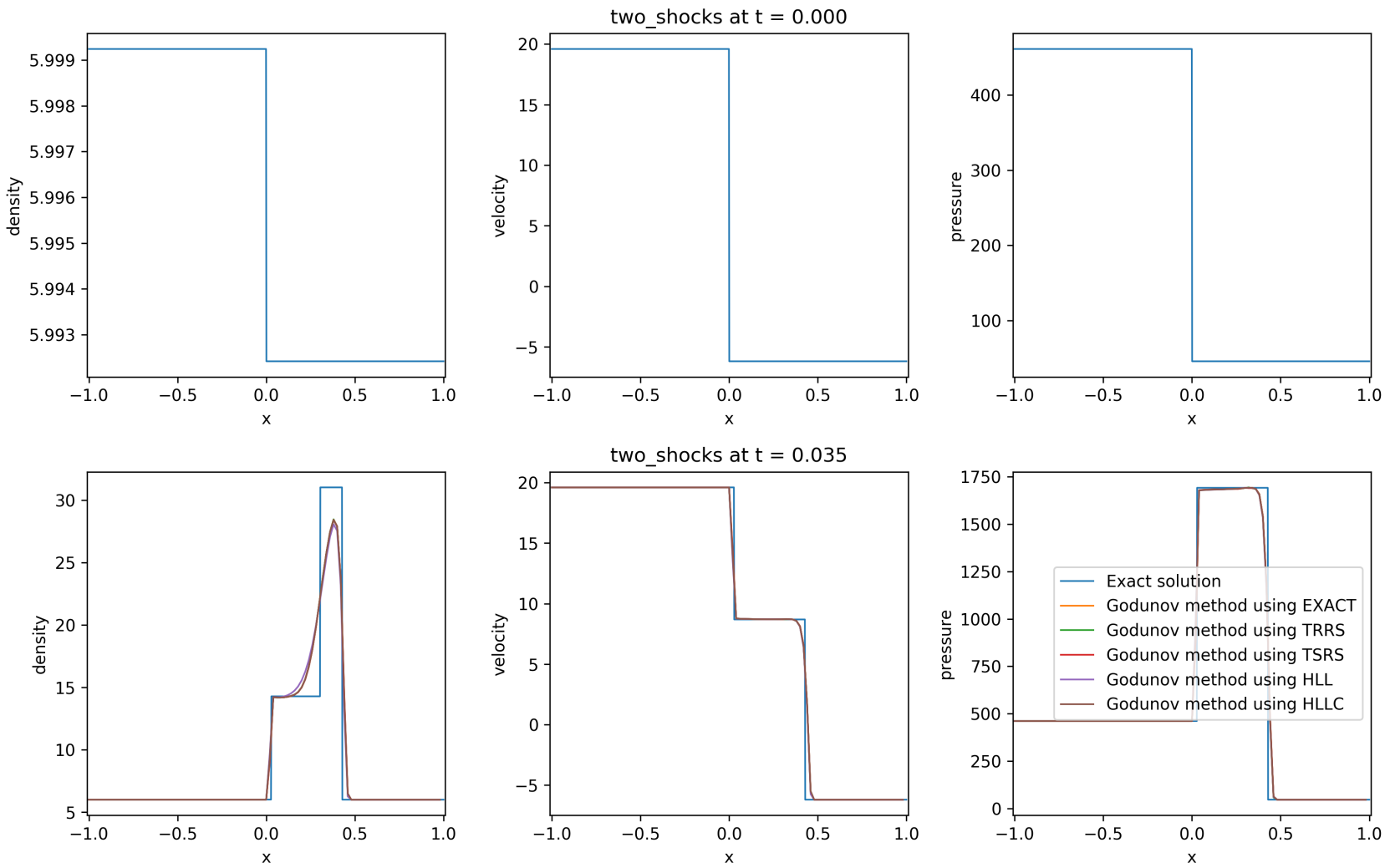
$nx = 100$


right_blast_wave at t = 0.000
density
velocity
pressure
x
right_blast_wave at t = 0.100
density
velocity
pressure
x
Exact solution
Godunov method using EXACT
Godunov method using TRRS
Godunov method using TSRS
Godunov method using HLL
Godunov method using HLLC

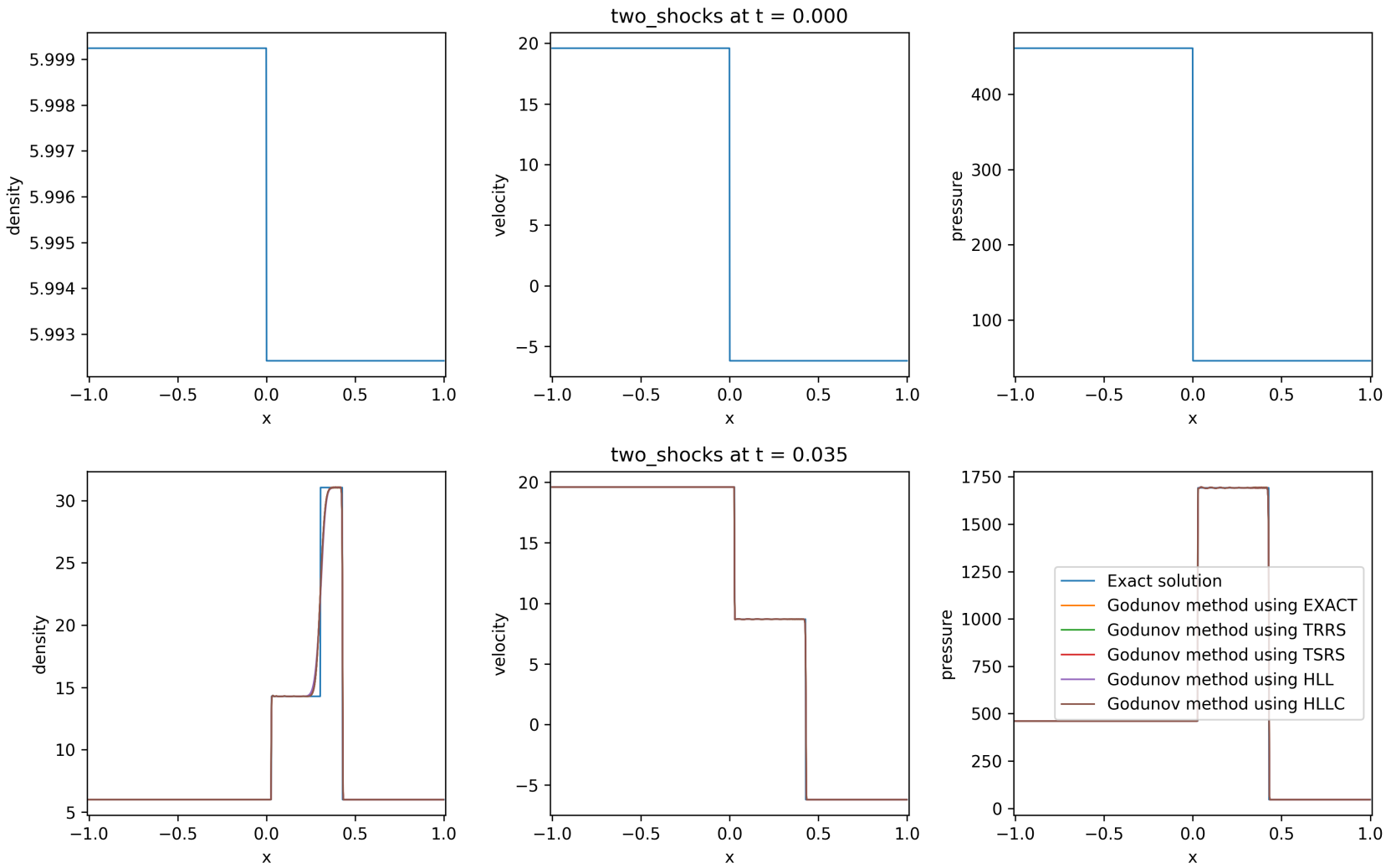
$nx = 1000$


right_blast_wave at t = 0.000
density
velocity
pressure
x
right_blast_wave at t = 0.100
density
velocity
pressure
x
Exact solution
Godunov method using EXACT
Godunov method using TRRS
Godunov method using TSRS
Godunov method using HLL
Godunov method using HLLC

$nx = 100$


two_shocks at t = 0.000
density
velocity
pressure
x
two_shocks at t = 0.035
density
velocity
pressure
x
Exact solution
Godunov method using EXACT
Godunov method using TRRS
Godunov method using TSRS
Godunov method using HLL
Godunov method using HLLC

$nx = 1000$


two_shocks at t = 0.000
density
velocity
pressure
x
two_shocks at t = 0.035
density
velocity
pressure
x
Exact solution
Godunov method using EXACT
Godunov method using TRRS
Godunov method using TSRS
Godunov method using HLL
Godunov method using HLLC