PHYS:5905 Homework 9

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1. HW 9a, Problem 1

   (a) Problem (f)
   The plot of of $u(x)$ is shown in Figure 1.

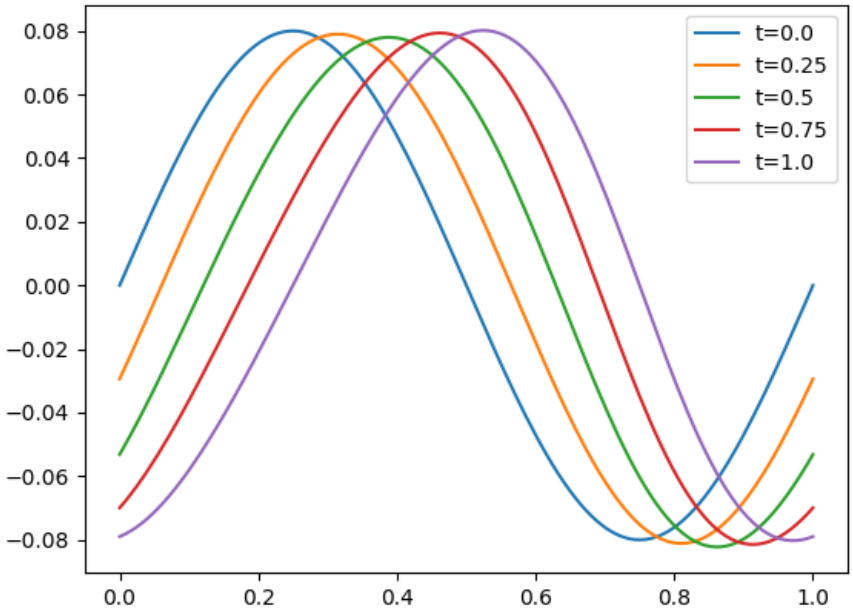

Figure 1: $u'(x)$ at $t = 0, 0.25, 0.5, 0.75, 1.0$ with $n_x = 128$, $\Delta t = \frac{1}{512}$.

   (b) Problem (h)
   The plot of $J_\pm$ at $t' = 0.25$ and $t' = 0.5$ is shown in Figure 2. J_- is approximately a constant.

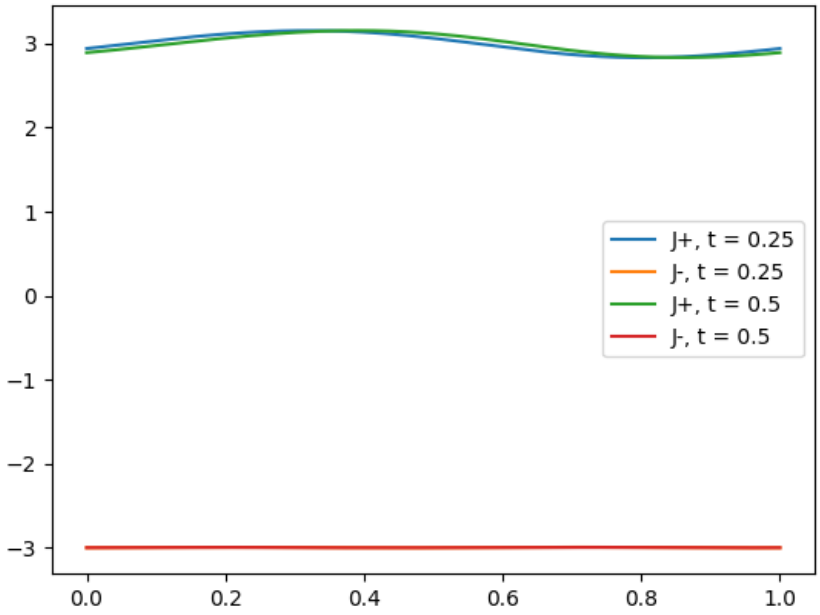

Figure 2: $J_{\pm}(x)$ at $t = 0.25, 0.5$.

(c) Problem (i)

Since J_+ is not constant, we advance x' at speed $u' + c'_s$ over t'. The result is shown in Figure 3.

(d) Problem (j)

The result is shown in Figure 4. There might be something wrong in my code, since there should already be a shock wave at $t = 2.0$.

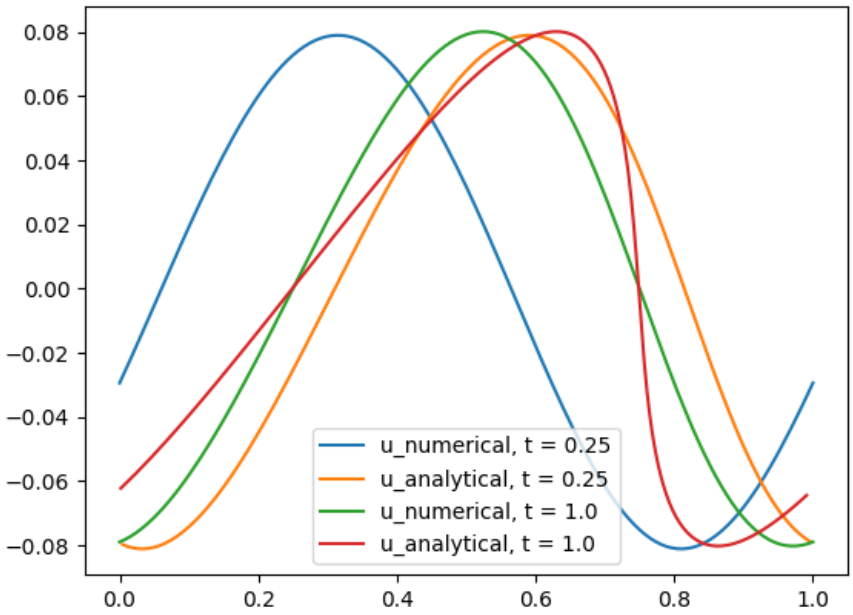

Figure 3: numerical and analytical solution of u at $t = 0.25, 1.0$.

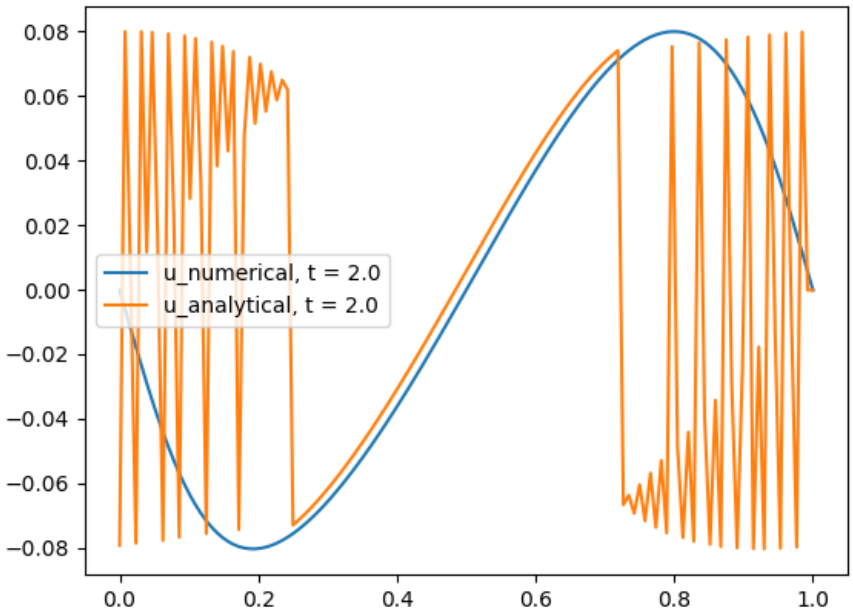

Figure 4: numerical and analytical solution of u at $t = 2.0$.