September 22, 2016, Revision: 1.4

1 Setup

A wave train with

$$\ln \rho = ux = (A/k)\, e^{-x^2/2\sigma^2} \sin(kx) \qquad (1)$$

is initialized with $A = 10^{-4}$, $\sigma = 0.5$, and $k = 10$ in a non-periodic domain $-\pi \leq x \leq \pi$.

For u_x we use an antisymmetric condition, but for the density there is no boundary condition. If we put an antisymmetric condition for $\ln \rho$, we find reflecting waves with almost unchanged amplitude. If we put a symmetric condition, the amplitude decreases significantly with each reflection.

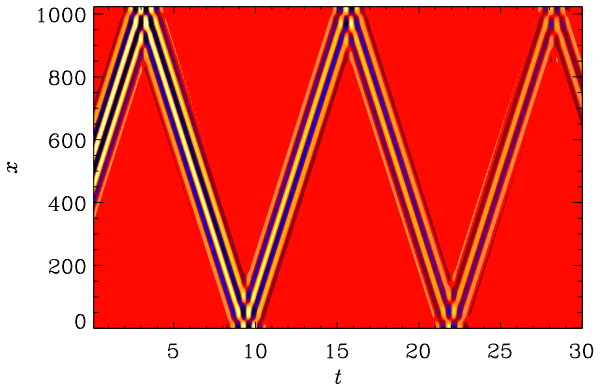

Figure 1: xt diagram of $u_x(x,t)$ for $\nu = 10^{-3}$ and nx=1024 meshpoints.

2 Questions

What is actually the correct condition for the density in this case?

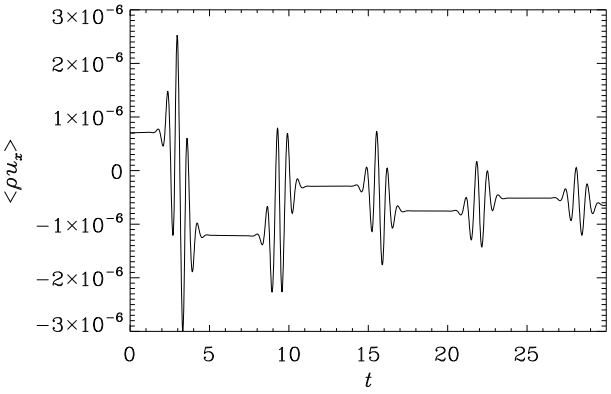

Figure 2: Linear momentum evolution using 'a' for $\nu = 10^{-3}$ and nx=1024 meshpoints.

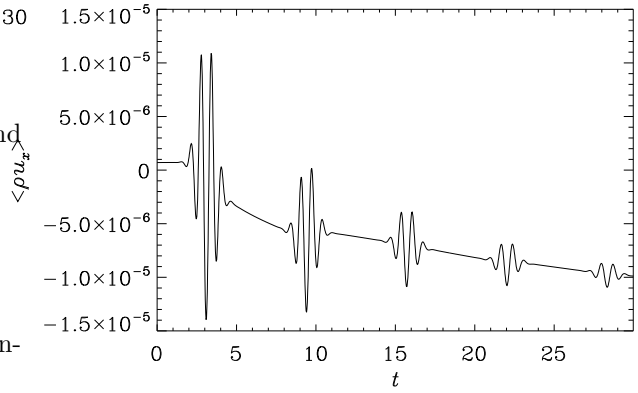

Figure 3: Linear momentum evolution using 's' for $\nu = 10^{-3}$ and nx=1024 meshpoints.

$Header: /var/cvs/brandenb/public_html/teach/PencilCode/material/NonlinearSound/WaveTrain/notes.tex,v 1.4 2016/09/22 20:09:37 brandenb Exp $

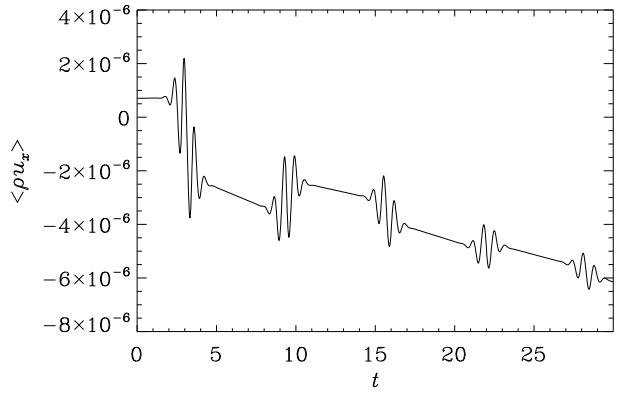

Figure 4: Linear momentum evolution using 'd1s' for u_z and $1s$ for ρ for $\nu = 10^{-3}$ and nx=1024 mesh-points.