Show equivalent to wave equation:
Eliminate either R or u. Better yet, introduce velocity potential:

$u = \phi_x$ and $(a_0^2/\rho_0)*R = - \phi_t$
\-------------/
Note this is the pressure perturbation.

Hence, second equation is satisfied. Then first equation gives

$\phi_{tt} - a_0^2*\phi_{xx} = 0$. Wave equation.

Note boundary conditions:

- Closed pipe: $\phi_x = 0$.
- Open pipe: $\phi = 0$.

Give other examples where these boundary conditions occur:

- Shallow water: Closed and open channel.
- String equation: Free end and clamped.

Using the solution above for gas-dynamics, we see that

$\phi = F(x-a_0*t) + G(x+a_0*t)]$,

where F' = (1/2)*f and G' = (1/2)*g.

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