A mathematical statement associated with the conservation of mass within an infinitesimal volume element V of air of equilibrium volume V_o is given by: $\rho V = \rho_o V_o = constant$.
Thus, the ***volumetric strain*** (relevant for sound propagation in air) is: $\delta V/V = -\delta\rho/\rho$
or: $\delta\rho\big|_{\rho=\rho_o} = -\rho_o\left(\delta V/V\right)$, hence to ***first*** order the over-pressure:

$$p = \delta P = P - P_o \simeq \left.\frac{\partial P}{\partial\rho}\right|_{\rho=\rho_o}\delta\rho = -\rho_o\left.\frac{\partial P}{\partial\rho}\right|_{\rho=\rho_o}\frac{\delta V}{V} = -B\frac{\delta V}{V}$$

where $B = \rho_o\,\partial P/\partial\rho\big|_{\rho=\rho_o}$ is the ***adiabatic bulk modulus*** of air {*e.g.* @ NTP}.

However, for ***adiabatic*** changes, the absolute air pressure $P = constant \times \rho^\gamma$ and thus:
$B = \rho_o\,\partial P/\partial\rho\big|_{\rho=\rho_o} = \gamma P_o$, hence:

$$p = \delta P = \left.\frac{\partial P}{\partial\rho}\right|_{\rho=\rho_o}\delta\rho = -\rho_o\left.\frac{\partial P}{\partial\rho}\right|_{\rho=\rho_o}\frac{\delta V}{V} = -B\frac{\delta V}{V} = +B\frac{\delta\rho}{\rho} = \gamma P_o\left(\frac{\rho-\rho_o}{\rho_o}\right) = \gamma P_o\cdot s$$

The fractional change in volume mass density is known as the ***condensation***: $s \equiv \dfrac{\delta\rho}{\rho} \simeq \dfrac{(\rho-\rho_o)}{\rho_o}$

Thus, for "everyday" audio sound over-pressure amplitudes $\left|\tilde{p}(\vec{r},t)\right| \ll 100\ RMS\ Pascals$ { $SPL \ll 134\,dB$ }, the response of air as a medium for sound propagation is very nearly ***linear***.

This in turn implies that for "everyday" sound over-pressure amplitudes, the volume mass density of air at NTP is nearly ***constant***, *i.e.* $\left|\tilde{\rho}(\vec{r},t)\right| \simeq \rho_o = 1.204\,kg/m^3$ {*i.e.* $\left|\tilde{s}(\vec{r},t)\right| \simeq 0$ }.
However, for "everyday" audio sound over-pressure amplitudes, with ***small*** pressure variations $\left(\left|\tilde{p}(\vec{r},t)\right| \ll P_o\right)$, since: $\tilde{\rho}(\vec{r},t) = \rho_o + \tilde{\rho}_a(\vec{r},t)$, thus: $\tilde{\rho}_a(\vec{r},t) = \delta\tilde{\rho}(\vec{r},t) = \tilde{\rho}(\vec{r},t) - \rho_o$ $\left(\left|\rho_a(\vec{r},t)\right| \ll \rho_o\right)$ is the {incremental} volume mass density "amplitude" associated with the presence of the acoustic sound field, the time derivatives $\partial\tilde{\rho}(\vec{r},t)/\partial t = \partial\tilde{\rho}_a(\vec{r},t)/\partial t \neq 0$ and $\partial\tilde{s}(\vec{r},t)/\partial t \neq 0$.

However, for $\left|\tilde{\rho}_a(\vec{r},t)\right| \ll \rho_o$, the ***non-linear*** $\vec{\nabla}\bullet\left(\tilde{\rho}(\vec{r},t)\vec{\tilde{u}}(\vec{r},t)\right)$ term in the ***mass continuity equation*** can be ***linearized***:

$$\vec{\nabla}\bullet\left(\tilde{\rho}(\vec{r},t)\vec{\tilde{u}}(\vec{r},t)\right) = \vec{\nabla}\bullet\left(\left\{\rho_o + \tilde{\rho}_a(\vec{r},t)\right\}\vec{\tilde{u}}(\vec{r},t)\right)$$
$$= \rho_o\vec{\nabla}\bullet\vec{\tilde{u}}(\vec{r},t) + \underbrace{\vec{\nabla}\bullet\left(\tilde{\rho}_a(\vec{r},t)\vec{\tilde{u}}(\vec{r},t)\right)}_{neglect} \simeq \rho_o\vec{\nabla}\bullet\vec{\tilde{u}}(\vec{r},t)$$