Acoustics in fluids

fluid: perfect, barotropic
flow: irrotational, small velocities

configuration variables
space: primal complex
time: dual complex
intervals

source variables
space: dual complex
time: primal complex
instants

dimension: action / mass

fundamental equation
D’Alembert
\[-1 \frac{1}{c^2} \frac{\partial^2 \phi}{\partial t^2} + \nabla^2 \phi = \frac{1}{\rho_0} \sigma_m\]

constitutive equation
Bernoulli
\[\phi = -\partial_t \chi\]

\[\chi = \frac{\rho_0}{s_c^2} \left(1 + \frac{\chi}{s_c^2}\right)\]

\[\sigma_m \text{ def } = \sqrt{\frac{\gamma p_0}{\rho_0}}\]

\[c = \frac{p_0}{\rho_0}\]

\[\phi \text{ kinetic potential}\]
\[\chi \text{ no known name}\]
\[\rho \text{ mass density}\]
\[q \text{ mass current density}\]
\[\sigma_m \text{ mass production density}\]
\[\rho_0 \text{ rest mass density}\]
\[p_0 \text{ static pressure}\]
\[c \text{ sound speed}\]
\[\gamma \text{ index of the polytropic}\]


related tables: FLd1, FLd4

Acoustics in fluids [FLU5]


related tables: FLd1, FLd4

FLU5-9: http://discretephysics.disar.units.it