For Thin cross Sections the following analysis will hold true.

\[
\begin{align*}
S_2: \quad \text{Boundary conditions of the 3 surfaces are given by the Cauchy equation} \\
M = \frac{\partial}{\partial t} \int_{\Omega} \tau \cdot \phi \, d\Omega 
\end{align*}
\]

Definitions:

\[
\begin{align*}
\sigma &= \frac{\tau}{\lambda} + \frac{\nu}{\lambda} \nabla \cdot \tau \\
\nu &= \frac{1}{2} \frac{\partial \phi}{\partial t} + \frac{1}{2} \frac{\partial \phi}{\partial t} \\
\end{align*}
\]

\[
\begin{align*}
\tau &= \sigma \frac{\partial \phi}{\partial x} \\
\phi &= \frac{\partial \phi}{\partial x} \\
\end{align*}
\]

Since 2D is nothing more than a limiting case of 3D (plane stress/plane strain)

\[
\begin{align*}
\tau &= \sigma \frac{\partial \phi}{\partial x} \\
\phi &= \frac{\partial \phi}{\partial x} \\
\end{align*}
\]

Material Behavior (Hook’s law)