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> #Source term Q for the 3D Navier-Stokes equations -
> # Energy e
>
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$$
\begin{aligned}
> \ Q\_e := & \left(\cos\left(\frac{a\_px\,\pi\,x}{L}\right) p\_x\, k\, a\_px^2\, \pi^2\right) \Big/ \left(L^2\, R \left(rho\_0 + rho\_x \sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)\right.\right. \\
& \left.\left. + rho\_y \cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right) + rho\_z \sin\left(\frac{a\_rhoz\,\pi\,z}{L}\right)\right)\right) \\
& - \left(2\cos\left(\frac{a\_rhox\,\pi\,x}{L}\right) rho\_x \sin\left(\frac{a\_px\,\pi\,x}{L}\right) p\_x\, k\, a\_px\, a\_rhox\, \pi^2\right) \Big/ \left(L^2\, R \left(rho\_0 + rho\_\right.\right. \\
& \left.\left. + rho\_z \sin\left(\frac{a\_rhoz\,\pi\,z}{L}\right)\right)^2\right) + \left(\sin\left(\frac{a\_py\,\pi\,y}{L}\right) p\_y\, k\, a\_py^2\, \pi^2\right) \Big/ \\
& \left(L^2\, R \left(rho\_0 + rho\_x \sin\left(\frac{a\_rhox\,\pi\,x}{L}\right) + rho\_y \cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)\right.\right. \\
& \left.\left. + rho\_z \sin\left(\frac{a\_rhoz\,\pi\,z}{L}\right)\right)\right) \\
& - \left(2\sin\left(\frac{a\_rhoy\,\pi\,y}{L}\right) rho\_y \cos\left(\frac{a\_py\,\pi\,y}{L}\right) p\_y\, k\, a\_py\, a\_rhoy\, \pi^2\right) \Big/ \left(L^2\, R \left(rho\_0 + rho\_\right.\right. \\
& \left.\left. + rho\_z \sin\left(\frac{a\_rhoz\,\pi\,z}{L}\right)\right)^2\right) + \left(\cos\left(\frac{a\_pz\,\pi\,z}{L}\right) p\_z\, k\, a\_pz^2\, \pi^2\right) \Big/ \\
& \left(L^2\, R \left(rho\_0 + rho\_x \sin\left(\frac{a\_rhox\,\pi\,x}{L}\right) + rho\_y \cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)\right.\right. \\
& \left.\left. + rho\_z \sin\left(\frac{a\_rhoz\,\pi\,z}{L}\right)\right)\right) \\
& - \left(2\cos\left(\frac{a\_rhoz\,\pi\,z}{L}\right) rho\_z \sin\left(\frac{a\_pz\,\pi\,z}{L}\right) p\_z\, k\, a\_pz\, a\_rhoz\, \pi^2\right) \Big/ \left(L^2\, R \left(rho\_0 + rho\_\right.\right. \\
& \left.\left. + rho\_z \sin\left(\frac{a\_rhoz\,\pi\,z}{L}\right)\right)^2\right) - \left(k\, rho\_x \left(p\_0 + p\_x \cos\left(\frac{a\_px\,\pi\,x}{L}\right)\right.\right. \\
& \left.\left. + p\_y \sin\left(\frac{a\_py\,\pi\,y}{L}\right) + p\_z \cos\left(\frac{a\_pz\,\pi\,z}{L}\right)\right) \left(\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right) rho\_0\right. \\
& \left. + rho\_x \sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)^2 + \sin\left(\frac{a\_rhox\,\pi\,x}{L}\right) rho\_z \sin\left(\frac{a\_rhoz\,\pi\,z}{L}\right)\right. \\
& \left. + 2\, rho\_x \cos\left(\frac{a\_rhox\,\pi\,x}{L}\right)^2 + \sin\left(\frac{a\_rhox\,\pi\,x}{L}\right) rho\_y \cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)\right) \\
& a\_rhox^2\, \pi^2\Big) \Big/ \left(R \left(rho\_0 + rho\_x \sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)\right.\right. \\
& \left.\left. + rho\_y \cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right) + rho\_z \sin\left(\frac{a\_rhoz\,\pi\,z}{L}\right)\right)^3 L^2\right) \\
& - \left(k\, rho\_y \left(p\_0 + p\_x \cos\left(\frac{a\_px\,\pi\,x}{L}\right) + p\_y \sin\left(\frac{a\_py\,\pi\,y}{L}\right) + p\_z \cos\left(\frac{a\_pz\,\pi\,z}{L}\right)\right) \left(rho\_\right.\right.
\end{aligned}
$$

$$+\cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)\,rho\_z\sin\left(\frac{a\_rhoz\,\pi\,z}{L}\right)+\cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)\,rho\_0\Bigg)$$
$$a\_rhoy^2\,\pi^2\Bigg)\Bigg/\left(R\left(rho\_0+rho\_x\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)\right.\right.$$
$$\left.\left.+\,rho\_y\cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)+rho\_z\sin\left(\frac{a\_rhoz\,\pi\,z}{L}\right)\right)^3L^2\right)$$
$$-\left(k\,rho\_z\left(p\_0+p\_x\cos\left(\frac{a\_px\,\pi\,x}{L}\right)+p\_y\sin\left(\frac{a\_py\,\pi\,y}{L}\right)+p\_z\cos\left(\frac{a\_pz\,\pi\,z}{L}\right)\right)\left(rho\_z\right.\right.$$
$$+\,rho\_y\cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)\sin\left(\frac{a\_rhoz\,\pi\,z}{L}\right)+\sin\left(\frac{a\_rhoz\,\pi\,z}{L}\right)\,rho\_0\Bigg)$$
$$a\_rhoz^2\,\pi^2\Bigg)\Bigg/\left(R\left(rho\_0+rho\_x\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)\right.\right.$$
$$\left.\left.+\,rho\_y\cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)+rho\_z\sin\left(\frac{a\_rhoz\,\pi\,z}{L}\right)\right)^3L^2\right)$$
$$+\frac{4}{3}\,\frac{1}{L^2}\left(\mu\,u\_x\left(\sin\left(\frac{a\_ux\,\pi\,x}{L}\right)\,u\_0+u\_x\sin\left(\frac{a\_ux\,\pi\,x}{L}\right)^2\right.\right.$$
$$+\sin\left(\frac{a\_ux\,\pi\,x}{L}\right)\,u\_y\cos\left(\frac{a\_uy\,\pi\,y}{L}\right)+\sin\left(\frac{a\_ux\,\pi\,x}{L}\right)\,u\_z\cos\left(\frac{a\_uz\,\pi\,z}{L}\right)$$
$$\left.\left.-\,u\_x\cos\left(\frac{a\_ux\,\pi\,x}{L}\right)^2\right)\,a\_ux^2\,\pi^2\right)$$
$$+\frac{4}{3}\,\frac{u\_x\cos\left(\frac{a\_ux\,\pi\,x}{L}\right)\,\mu\,v\_y\cos\left(\frac{a\_vy\,\pi\,y}{L}\right)\,a\_ux\,a\_vy\,\pi^2}{L^2}$$
$$-\frac{4}{3}\,\frac{w\_z\sin\left(\frac{a\_wz\,\pi\,z}{L}\right)\,\mu\,u\_x\cos\left(\frac{a\_ux\,\pi\,x}{L}\right)\,a\_ux\,a\_wz\,\pi^2}{L^2}$$
$$+\frac{1}{L^2}\left(u\_y\,\mu\left(-u\_y\sin\left(\frac{a\_uy\,\pi\,y}{L}\right)^2+\cos\left(\frac{a\_uy\,\pi\,y}{L}\right)\,u\_0\right.\right.$$
$$+\cos\left(\frac{a\_uy\,\pi\,y}{L}\right)\,u\_x\sin\left(\frac{a\_ux\,\pi\,x}{L}\right)+u\_y\cos\left(\frac{a\_uy\,\pi\,y}{L}\right)^2$$
$$\left.\left.+\cos\left(\frac{a\_uy\,\pi\,y}{L}\right)\,u\_z\cos\left(\frac{a\_uz\,\pi\,z}{L}\right)\right)\,a\_uy^2\,\pi^2\right)$$
$$-\frac{2\,v\_x\sin\left(\frac{a\_vx\,\pi\,x}{L}\right)\,\mu\,u\_y\sin\left(\frac{a\_uy\,\pi\,y}{L}\right)\,a\_uy\,a\_vx\,\pi^2}{L^2}+\frac{1}{L^2}\left(u\_z\,\mu\left(\right.\right.$$
$$-u\_z\sin\left(\frac{a\_uz\,\pi\,z}{L}\right)^2+\cos\left(\frac{a\_uz\,\pi\,z}{L}\right)\,u\_0$$
$$+\cos\left(\frac{a\_uz\,\pi\,z}{L}\right)\,u\_x\sin\left(\frac{a\_ux\,\pi\,x}{L}\right)+\cos\left(\frac{a\_uz\,\pi\,z}{L}\right)\,u\_y\cos\left(\frac{a\_uy\,\pi\,y}{L}\right)$$

$$+ u\_z \cos\left(\frac{a\_uz\,\pi\,z}{L}\right)^2\Bigg)\, a\_uz^2\,\pi^2\Bigg)$$
$$+ \frac{2\; w\_x \cos\left(\frac{a\_wx\,\pi\,x}{L}\right)\mu\, u\_z \sin\left(\frac{a\_uz\,\pi\,z}{L}\right) a\_uz\, a\_wx\,\pi^2}{L^2} + \frac{1}{L^2}\Bigg(\mu\, v\_x\Bigg($$
$$- v\_x \sin\left(\frac{a\_vx\,\pi\,x}{L}\right)^2 + \cos\left(\frac{a\_vx\,\pi\,x}{L}\right) v\_0 + v\_x \cos\left(\frac{a\_vx\,\pi\,x}{L}\right)^2$$
$$+ \cos\left(\frac{a\_vx\,\pi\,x}{L}\right) v\_y \sin\left(\frac{a\_vy\,\pi\,y}{L}\right) + \cos\left(\frac{a\_vx\,\pi\,x}{L}\right) v\_z \sin\left(\frac{a\_vz\,\pi\,z}{L}\right)\Bigg)$$
$$a\_vx^2\,\pi^2\Bigg) + \frac{4}{3}\;\frac{1}{L^2}\Bigg(\mu\, v\_y\Bigg(\sin\left(\frac{a\_vy\,\pi\,y}{L}\right) v\_0$$
$$+ \sin\left(\frac{a\_vy\,\pi\,y}{L}\right) v\_x \cos\left(\frac{a\_vx\,\pi\,x}{L}\right) + v\_y \sin\left(\frac{a\_vy\,\pi\,y}{L}\right)^2$$
$$+ \sin\left(\frac{a\_vy\,\pi\,y}{L}\right) v\_z \sin\left(\frac{a\_vz\,\pi\,z}{L}\right) - v\_y \cos\left(\frac{a\_vy\,\pi\,y}{L}\right)^2\Bigg)\, a\_vy^2\,\pi^2\Bigg)$$
$$- \frac{4}{3}\;\frac{v\_y \cos\left(\frac{a\_vy\,\pi\,y}{L}\right)\mu\, w\_z \sin\left(\frac{a\_wz\,\pi\,z}{L}\right) a\_vy\, a\_wz\,\pi^2}{L^2}$$
$$+ \frac{1}{L^2}\Bigg(v\_z\,\mu\Bigg(- v\_z \cos\left(\frac{a\_vz\,\pi\,z}{L}\right)^2 + \sin\left(\frac{a\_vz\,\pi\,z}{L}\right) v\_0$$
$$+ \sin\left(\frac{a\_vz\,\pi\,z}{L}\right) v\_x \cos\left(\frac{a\_vx\,\pi\,x}{L}\right) + \sin\left(\frac{a\_vz\,\pi\,z}{L}\right) v\_y \sin\left(\frac{a\_vy\,\pi\,y}{L}\right)$$
$$+ v\_z \sin\left(\frac{a\_vz\,\pi\,z}{L}\right)^2\Bigg)\, a\_vz^2\,\pi^2\Bigg)$$
$$- \frac{2\; v\_z \cos\left(\frac{a\_vz\,\pi\,z}{L}\right)\mu\, w\_y \cos\left(\frac{a\_wy\,\pi\,y}{L}\right) a\_vz\, a\_wy\,\pi^2}{L^2} + \frac{1}{L^2}\Bigg(\mu\, w\_x\Bigg($$
$$- w\_x \cos\left(\frac{a\_wx\,\pi\,x}{L}\right)^2 + \sin\left(\frac{a\_wx\,\pi\,x}{L}\right) w\_0 + w\_x \sin\left(\frac{a\_wx\,\pi\,x}{L}\right)^2$$
$$+ \sin\left(\frac{a\_wx\,\pi\,x}{L}\right) w\_y \sin\left(\frac{a\_wy\,\pi\,y}{L}\right) + \sin\left(\frac{a\_wx\,\pi\,x}{L}\right) w\_z \cos\left(\frac{a\_wz\,\pi\,z}{L}\right)\Bigg)$$
$$a\_wx^2\,\pi^2\Bigg) + \frac{1}{L^2}\Bigg(\mu\, w\_y\Bigg(- w\_y \cos\left(\frac{a\_wy\,\pi\,y}{L}\right)^2 + \sin\left(\frac{a\_wy\,\pi\,y}{L}\right) w\_0$$
$$+ \sin\left(\frac{a\_wy\,\pi\,y}{L}\right) w\_x \sin\left(\frac{a\_wx\,\pi\,x}{L}\right) + w\_y \sin\left(\frac{a\_wy\,\pi\,y}{L}\right)^2$$
$$+ \sin\left(\frac{a\_wy\,\pi\,y}{L}\right) w\_z \cos\left(\frac{a\_wz\,\pi\,z}{L}\right)\Bigg)\, a\_wy^2\,\pi^2\Bigg) + \frac{4}{3}\;\frac{1}{L^2}\Bigg(\mu\, w\_z\Bigg($$
$$- w\_z \sin\left(\frac{a\_wz\,\pi\,z}{L}\right)^2 + \cos\left(\frac{a\_wz\,\pi\,z}{L}\right) w\_0$$

$$+\cos\left(\frac{a\_wz\,\pi\,z}{L}\right) w\_x \sin\left(\frac{a\_wx\,\pi\,x}{L}\right) + \cos\left(\frac{a\_wz\,\pi\,z}{L}\right) w\_y \sin\left(\frac{a\_wy\,\pi\,y}{L}\right)$$
$$+ w\_z \cos\left(\frac{a\_wz\,\pi\,z}{L}\right)^2\Bigg) a\_wz^2\,\pi^2\Bigg) - \frac{1}{L\,(\gamma-1)}\left(\gamma\left(u\_0\right.\right.$$
$$+ u\_x \sin\left(\frac{a\_ux\,\pi\,x}{L}\right) + u\_y \cos\left(\frac{a\_uy\,\pi\,y}{L}\right) + u\_z \cos\left(\frac{a\_uz\,\pi\,z}{L}\right)\Bigg)$$
$$p\_x \sin\left(\frac{a\_px\,\pi\,x}{L}\right) a\_px\,\pi\Bigg) + \frac{1}{L\,(\gamma-1)}\left(\gamma\left(v\_0 + v\_x \cos\left(\frac{a\_vx\,\pi\,x}{L}\right)\right.\right.$$
$$+ v\_y \sin\left(\frac{a\_vy\,\pi\,y}{L}\right) + v\_z \sin\left(\frac{a\_vz\,\pi\,z}{L}\right)\Bigg) p\_y \cos\left(\frac{a\_py\,\pi\,y}{L}\right) a\_py\,\pi\Bigg)$$
$$- \frac{1}{L\,(\gamma-1)}\left(\gamma\left(w\_0 + w\_x \sin\left(\frac{a\_wx\,\pi\,x}{L}\right) + w\_y \sin\left(\frac{a\_wy\,\pi\,y}{L}\right)\right.\right.$$
$$+ w\_z \cos\left(\frac{a\_wz\,\pi\,z}{L}\right)\Bigg) p\_z \sin\left(\frac{a\_pz\,\pi\,z}{L}\right) a\_pz\,\pi\Bigg)$$
$$+ \frac{1}{2}\,\frac{1}{L}\left(\cos\left(\frac{a\_rhox\,\pi\,x}{L}\right) rho\_x \left(u\_0 + u\_x \sin\left(\frac{a\_ux\,\pi\,x}{L}\right)\right.\right.$$
$$+ u\_y \cos\left(\frac{a\_uy\,\pi\,y}{L}\right) + u\_z \cos\left(\frac{a\_uz\,\pi\,z}{L}\right)\Bigg)\Bigg)\left(u\_0^2 + v\_0^2 + w\_0^2\right.$$
$$+ v\_z^2 \sin\left(\frac{a\_vz\,\pi\,z}{L}\right)^2 + v\_x^2 \cos\left(\frac{a\_vx\,\pi\,x}{L}\right)^2 + v\_y^2 \sin\left(\frac{a\_vy\,\pi\,y}{L}\right)^2$$
$$+ w\_z^2 \cos\left(\frac{a\_wz\,\pi\,z}{L}\right)^2 + w\_x^2 \sin\left(\frac{a\_wx\,\pi\,x}{L}\right)^2 + w\_y^2 \sin\left(\frac{a\_wy\,\pi\,y}{L}\right)^2$$
$$+ u\_x^2 \sin\left(\frac{a\_ux\,\pi\,x}{L}\right)^2 + u\_y^2 \cos\left(\frac{a\_uy\,\pi\,y}{L}\right)^2 + u\_z^2 \cos\left(\frac{a\_uz\,\pi\,z}{L}\right)^2$$
$$+ 2\,u\_0\,u\_x \sin\left(\frac{a\_ux\,\pi\,x}{L}\right) + 2\,u\_0\,u\_y \cos\left(\frac{a\_uy\,\pi\,y}{L}\right)$$
$$+ 2\,u\_0\,u\_z \cos\left(\frac{a\_uz\,\pi\,z}{L}\right) + 2\,v\_z \sin\left(\frac{a\_vz\,\pi\,z}{L}\right) v\_0$$
$$+ 2\,v\_0\,v\_x \cos\left(\frac{a\_vx\,\pi\,x}{L}\right) + 2\,v\_0\,v\_y \sin\left(\frac{a\_vy\,\pi\,y}{L}\right)$$
$$+ 2\,w\_z \cos\left(\frac{a\_wz\,\pi\,z}{L}\right) w\_0 + 2\,w\_0\,w\_x \sin\left(\frac{a\_wx\,\pi\,x}{L}\right)$$
$$+ 2\,w\_0\,w\_y \sin\left(\frac{a\_wy\,\pi\,y}{L}\right) + 2\,u\_x \sin\left(\frac{a\_ux\,\pi\,x}{L}\right) u\_y \cos\left(\frac{a\_uy\,\pi\,y}{L}\right)$$
$$+ 2\,u\_x \sin\left(\frac{a\_ux\,\pi\,x}{L}\right) u\_z \cos\left(\frac{a\_uz\,\pi\,z}{L}\right)$$
$$+ 2\,u\_y \cos\left(\frac{a\_uy\,\pi\,y}{L}\right) u\_z \cos\left(\frac{a\_uz\,\pi\,z}{L}\right)$$
$$+ 2\,v\_z \sin\left(\frac{a\_vz\,\pi\,z}{L}\right) v\_x \cos\left(\frac{a\_vx\,\pi\,x}{L}\right)$$

$$
\begin{aligned}
&+2\ v\_z \sin\left(\frac{a\_vz\,\pi\,z}{L}\right) v\_y \sin\left(\frac{a\_vy\,\pi\,y}{L}\right)\\
&+2\ v\_x \cos\left(\frac{a\_vx\,\pi\,x}{L}\right) v\_y \sin\left(\frac{a\_vy\,\pi\,y}{L}\right)\\
&+2\ w\_z \cos\left(\frac{a\_wz\,\pi\,z}{L}\right) w\_x \sin\left(\frac{a\_wx\,\pi\,x}{L}\right)\\
&+2\ w\_z \cos\left(\frac{a\_wz\,\pi\,z}{L}\right) w\_y \sin\left(\frac{a\_wy\,\pi\,y}{L}\right)\\
&+2\ w\_x \sin\left(\frac{a\_wx\,\pi\,x}{L}\right) w\_y \sin\left(\frac{a\_wy\,\pi\,y}{L}\right)\Bigg)\ a\_rhox\,\pi\Bigg)\\
&-\frac{1}{2}\ \frac{1}{L}\Bigg(\sin\left(\frac{a\_rhoy\,\pi\,y}{L}\right) rho\_y \left(v\_0 + v\_x \cos\left(\frac{a\_vx\,\pi\,x}{L}\right)\right.\\
&\left.+\ v\_y \sin\left(\frac{a\_vy\,\pi\,y}{L}\right) + v\_z \sin\left(\frac{a\_vz\,\pi\,z}{L}\right)\right)\Bigg)\Bigg(u\_0^2 + v\_0^2 + w\_0^2\\
&+ v\_z^2 \sin\left(\frac{a\_vz\,\pi\,z}{L}\right)^2 + v\_x^2 \cos\left(\frac{a\_vx\,\pi\,x}{L}\right)^2 + v\_y^2 \sin\left(\frac{a\_vy\,\pi\,y}{L}\right)^2\\
&+ w\_z^2 \cos\left(\frac{a\_wz\,\pi\,z}{L}\right)^2 + w\_x^2 \sin\left(\frac{a\_wx\,\pi\,x}{L}\right)^2 + w\_y^2 \sin\left(\frac{a\_wy\,\pi\,y}{L}\right)^2\\
&+ u\_x^2 \sin\left(\frac{a\_ux\,\pi\,x}{L}\right)^2 + u\_y^2 \cos\left(\frac{a\_uy\,\pi\,y}{L}\right)^2 + u\_z^2 \cos\left(\frac{a\_uz\,\pi\,z}{L}\right)^2\\
&+2\ u\_0\, u\_x \sin\left(\frac{a\_ux\,\pi\,x}{L}\right) + 2\ u\_0\, u\_y \cos\left(\frac{a\_uy\,\pi\,y}{L}\right)\\
&+2\ u\_0\, u\_z \cos\left(\frac{a\_uz\,\pi\,z}{L}\right) + 2\ v\_z \sin\left(\frac{a\_vz\,\pi\,z}{L}\right) v\_0\\
&+2\ v\_0\, v\_x \cos\left(\frac{a\_vx\,\pi\,x}{L}\right) + 2\ v\_0\, v\_y \sin\left(\frac{a\_vy\,\pi\,y}{L}\right)\\
&+2\ w\_z \cos\left(\frac{a\_wz\,\pi\,z}{L}\right) w\_0 + 2\ w\_0\, w\_x \sin\left(\frac{a\_wx\,\pi\,x}{L}\right)\\
&+2\ w\_0\, w\_y \sin\left(\frac{a\_wy\,\pi\,y}{L}\right) + 2\ u\_x \sin\left(\frac{a\_ux\,\pi\,x}{L}\right) u\_y \cos\left(\frac{a\_uy\,\pi\,y}{L}\right)\\
&+2\ u\_x \sin\left(\frac{a\_ux\,\pi\,x}{L}\right) u\_z \cos\left(\frac{a\_uz\,\pi\,z}{L}\right)\\
&+2\ u\_y \cos\left(\frac{a\_uy\,\pi\,y}{L}\right) u\_z \cos\left(\frac{a\_uz\,\pi\,z}{L}\right)\\
&+2\ v\_z \sin\left(\frac{a\_vz\,\pi\,z}{L}\right) v\_x \cos\left(\frac{a\_vx\,\pi\,x}{L}\right)\\
&+2\ v\_z \sin\left(\frac{a\_vz\,\pi\,z}{L}\right) v\_y \sin\left(\frac{a\_vy\,\pi\,y}{L}\right)\\
&+2\ v\_x \cos\left(\frac{a\_vx\,\pi\,x}{L}\right) v\_y \sin\left(\frac{a\_vy\,\pi\,y}{L}\right)
\end{aligned}
$$

$$
\begin{aligned}
&+2\,w\_z\cos\left(\frac{a\_wz\,\pi\,z}{L}\right)\,w\_x\sin\left(\frac{a\_wx\,\pi\,x}{L}\right)\\
&+2\,w\_z\cos\left(\frac{a\_wz\,\pi\,z}{L}\right)\,w\_y\sin\left(\frac{a\_wy\,\pi\,y}{L}\right)\\
&+2\,w\_x\sin\left(\frac{a\_wx\,\pi\,x}{L}\right)\,w\_y\sin\left(\frac{a\_wy\,\pi\,y}{L}\right)\Bigg)\,a\_rhoy\,\pi\Bigg)\\
&+\frac{1}{2}\,\frac{1}{L}\left(\cos\left(\frac{a\_rhoz\,\pi\,z}{L}\right)\,rho\_z\left(w\_0+w\_x\sin\left(\frac{a\_wx\,\pi\,x}{L}\right)\right.\right.\\
&\left.+w\_y\sin\left(\frac{a\_wy\,\pi\,y}{L}\right)+w\_z\cos\left(\frac{a\_wz\,\pi\,z}{L}\right)\right)\left(u\_0^2+v\_0^2+w\_0^2\right.\\
&+v\_z^2\sin\left(\frac{a\_vz\,\pi\,z}{L}\right)^2+v\_x^2\cos\left(\frac{a\_vx\,\pi\,x}{L}\right)^2+v\_y^2\sin\left(\frac{a\_vy\,\pi\,y}{L}\right)^2\\
&+w\_z^2\cos\left(\frac{a\_wz\,\pi\,z}{L}\right)^2+w\_x^2\sin\left(\frac{a\_wx\,\pi\,x}{L}\right)^2+w\_y^2\sin\left(\frac{a\_wy\,\pi\,y}{L}\right)^2\\
&+u\_x^2\sin\left(\frac{a\_ux\,\pi\,x}{L}\right)^2+u\_y^2\cos\left(\frac{a\_uy\,\pi\,y}{L}\right)^2+u\_z^2\cos\left(\frac{a\_uz\,\pi\,z}{L}\right)^2\\
&+2\,u\_0\,u\_x\sin\left(\frac{a\_ux\,\pi\,x}{L}\right)+2\,u\_0\,u\_y\cos\left(\frac{a\_uy\,\pi\,y}{L}\right)\\
&+2\,u\_0\,u\_z\cos\left(\frac{a\_uz\,\pi\,z}{L}\right)+2\,v\_z\sin\left(\frac{a\_vz\,\pi\,z}{L}\right)\,v\_0\\
&+2\,v\_0\,v\_x\cos\left(\frac{a\_vx\,\pi\,x}{L}\right)+2\,v\_0\,v\_y\sin\left(\frac{a\_vy\,\pi\,y}{L}\right)\\
&+2\,w\_z\cos\left(\frac{a\_wz\,\pi\,z}{L}\right)\,w\_0+2\,w\_0\,w\_x\sin\left(\frac{a\_wx\,\pi\,x}{L}\right)\\
&+2\,w\_0\,w\_y\sin\left(\frac{a\_wy\,\pi\,y}{L}\right)+2\,u\_x\sin\left(\frac{a\_ux\,\pi\,x}{L}\right)\,u\_y\cos\left(\frac{a\_uy\,\pi\,y}{L}\right)\\
&+2\,u\_x\sin\left(\frac{a\_ux\,\pi\,x}{L}\right)\,u\_z\cos\left(\frac{a\_uz\,\pi\,z}{L}\right)\\
&+2\,u\_y\cos\left(\frac{a\_uy\,\pi\,y}{L}\right)\,u\_z\cos\left(\frac{a\_uz\,\pi\,z}{L}\right)\\
&+2\,v\_z\sin\left(\frac{a\_vz\,\pi\,z}{L}\right)\,v\_x\cos\left(\frac{a\_vx\,\pi\,x}{L}\right)\\
&+2\,v\_z\sin\left(\frac{a\_vz\,\pi\,z}{L}\right)\,v\_y\sin\left(\frac{a\_vy\,\pi\,y}{L}\right)\\
&+2\,v\_x\cos\left(\frac{a\_vx\,\pi\,x}{L}\right)\,v\_y\sin\left(\frac{a\_vy\,\pi\,y}{L}\right)\\
&+2\,w\_z\cos\left(\frac{a\_wz\,\pi\,z}{L}\right)\,w\_x\sin\left(\frac{a\_wx\,\pi\,x}{L}\right)\\
&+2\,w\_z\cos\left(\frac{a\_wz\,\pi\,z}{L}\right)\,w\_y\sin\left(\frac{a\_wy\,\pi\,y}{L}\right)
\end{aligned}
$$

$$+2\,w\_x\sin\left(\frac{a\_wx\pi x}{L}\right)w\_y\sin\left(\frac{a\_wy\pi y}{L}\right)\Bigg)a\_rhoz\pi\Bigg)$$
$$+\frac{1}{2}\,\frac{1}{L\,(\gamma-1)}\Bigg(\Bigg(2\,p\_x\cos\left(\frac{a\_px\pi x}{L}\right)\gamma+2\,p\_y\sin\left(\frac{a\_py\pi y}{L}\right)\gamma$$
$$+2\,p\_z\cos\left(\frac{a\_pz\pi z}{L}\right)\gamma+2\,p\_0\gamma-3\,u\_0^2\,rho\_0-v\_0^2\,rho\_0-w\_0^2\,rho\_0$$
$$-3\,u\_0^2\,rho\_z\sin\left(\frac{a\_rhoz\pi z}{L}\right)-3\,u\_0^2\,rho\_x\sin\left(\frac{a\_rhox\pi x}{L}\right)$$
$$-3\,u\_0^2\,rho\_y\cos\left(\frac{a\_rhoy\pi y}{L}\right)-3\,u\_x^2\sin\left(\frac{a\_ux\pi x}{L}\right)^2rho\_0$$
$$-3\,u\_y^2\cos\left(\frac{a\_uy\pi y}{L}\right)^2rho\_0-3\,u\_z^2\cos\left(\frac{a\_uz\pi z}{L}\right)^2rho\_0$$
$$+3\,u\_0^2\,\gamma\,rho\_0-v\_0^2\,rho\_z\sin\left(\frac{a\_rhoz\pi z}{L}\right)-v\_0^2\,rho\_x\sin\left(\frac{a\_rhox\pi x}{L}\right)$$
$$-v\_0^2\,rho\_y\cos\left(\frac{a\_rhoy\pi y}{L}\right)-w\_0^2\,rho\_z\sin\left(\frac{a\_rhoz\pi z}{L}\right)$$
$$-w\_0^2\,rho\_x\sin\left(\frac{a\_rhox\pi x}{L}\right)-w\_0^2\,rho\_y\cos\left(\frac{a\_rhoy\pi y}{L}\right)+\gamma\,v\_0^2\,rho\_0$$
$$+\gamma\,w\_0^2\,rho\_0-v\_z^2\sin\left(\frac{a\_vz\pi z}{L}\right)^2rho\_0-v\_x^2\cos\left(\frac{a\_vx\pi x}{L}\right)^2rho\_0$$
$$-v\_y^2\sin\left(\frac{a\_vy\pi y}{L}\right)^2rho\_0-w\_z^2\cos\left(\frac{a\_wz\pi z}{L}\right)^2rho\_0$$
$$-w\_x^2\sin\left(\frac{a\_wx\pi x}{L}\right)^2rho\_0-w\_y^2\sin\left(\frac{a\_wy\pi y}{L}\right)^2rho\_0$$
$$-3\,u\_x^2\sin\left(\frac{a\_ux\pi x}{L}\right)^2rho\_z\sin\left(\frac{a\_rhoz\pi z}{L}\right)$$
$$-3\,u\_x^2\sin\left(\frac{a\_ux\pi x}{L}\right)^2rho\_x\sin\left(\frac{a\_rhox\pi x}{L}\right)$$
$$-3\,u\_x^2\sin\left(\frac{a\_ux\pi x}{L}\right)^2rho\_y\cos\left(\frac{a\_rhoy\pi y}{L}\right)$$
$$-3\,u\_y^2\cos\left(\frac{a\_uy\pi y}{L}\right)^2rho\_z\sin\left(\frac{a\_rhoz\pi z}{L}\right)$$
$$-3\,u\_y^2\cos\left(\frac{a\_uy\pi y}{L}\right)^2rho\_x\sin\left(\frac{a\_rhox\pi x}{L}\right)$$
$$-3\,u\_y^2\cos\left(\frac{a\_uy\pi y}{L}\right)^2rho\_y\cos\left(\frac{a\_rhoy\pi y}{L}\right)$$
$$-3\,u\_z^2\cos\left(\frac{a\_uz\pi z}{L}\right)^2rho\_z\sin\left(\frac{a\_rhoz\pi z}{L}\right)$$
$$-3\,u\_z^2\cos\left(\frac{a\_uz\pi z}{L}\right)^2rho\_x\sin\left(\frac{a\_rhox\pi x}{L}\right)$$

$$
\begin{aligned}
&-3\,u\_z^2\cos\left(\frac{a\_uz\,\pi\,z}{L}\right)^2 rho\_y\cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)\\
&+3\,u\_0^2\,\gamma\,rho\_z\sin\left(\frac{a\_rhoz\,\pi\,z}{L}\right)+3\,u\_0^2\,\gamma\,rho\_x\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)\\
&+3\,u\_0^2\,\gamma\,rho\_y\cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)-6\,u\_0\,u\_x\sin\left(\frac{a\_ux\,\pi\,x}{L}\right)rho\_0\\
&-6\,u\_0\,u\_y\cos\left(\frac{a\_uy\,\pi\,y}{L}\right)rho\_0-6\,u\_0\,u\_z\cos\left(\frac{a\_uz\,\pi\,z}{L}\right)rho\_0\\
&+3\,u\_x^2\sin\left(\frac{a\_ux\,\pi\,x}{L}\right)^2\gamma\,rho\_0+3\,u\_y^2\cos\left(\frac{a\_uy\,\pi\,y}{L}\right)^2\gamma\,rho\_0\\
&+3\,u\_z^2\cos\left(\frac{a\_uz\,\pi\,z}{L}\right)^2\gamma\,rho\_0+\gamma\,v\_z^2\sin\left(\frac{a\_vz\,\pi\,z}{L}\right)^2 rho\_0\\
&+\gamma\,v\_x^2\cos\left(\frac{a\_vx\,\pi\,x}{L}\right)^2 rho\_0+\gamma\,v\_y^2\sin\left(\frac{a\_vy\,\pi\,y}{L}\right)^2 rho\_0\\
&+\gamma\,w\_z^2\cos\left(\frac{a\_wz\,\pi\,z}{L}\right)^2 rho\_0+\gamma\,w\_x^2\sin\left(\frac{a\_wx\,\pi\,x}{L}\right)^2 rho\_0\\
&+\gamma\,w\_y^2\sin\left(\frac{a\_wy\,\pi\,y}{L}\right)^2 rho\_0-2\,v\_z\sin\left(\frac{a\_vz\,\pi\,z}{L}\right)v\_0\,rho\_0\\
&-2\,v\_0\,v\_x\cos\left(\frac{a\_vx\,\pi\,x}{L}\right)rho\_0-2\,v\_0\,v\_y\sin\left(\frac{a\_vy\,\pi\,y}{L}\right)rho\_0\\
&+\gamma\,v\_0^2\,rho\_z\sin\left(\frac{a\_rhoz\,\pi\,z}{L}\right)+\gamma\,v\_0^2\,rho\_x\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)\\
&+\gamma\,v\_0^2\,rho\_y\cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)+\gamma\,w\_0^2\,rho\_z\sin\left(\frac{a\_rhoz\,\pi\,z}{L}\right)\\
&+\gamma\,w\_0^2\,rho\_x\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)+\gamma\,w\_0^2\,rho\_y\cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)\\
&-2\,w\_z\cos\left(\frac{a\_wz\,\pi\,z}{L}\right)w\_0\,rho\_0-2\,w\_0\,w\_x\sin\left(\frac{a\_wx\,\pi\,x}{L}\right)rho\_0\\
&-2\,w\_0\,w\_y\sin\left(\frac{a\_wy\,\pi\,y}{L}\right)rho\_0\\
&-v\_z^2\sin\left(\frac{a\_vz\,\pi\,z}{L}\right)^2 rho\_z\sin\left(\frac{a\_rhoz\,\pi\,z}{L}\right)\\
&-v\_z^2\sin\left(\frac{a\_vz\,\pi\,z}{L}\right)^2 rho\_x\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)\\
&-v\_z^2\sin\left(\frac{a\_vz\,\pi\,z}{L}\right)^2 rho\_y\cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)\\
&-v\_x^2\cos\left(\frac{a\_vx\,\pi\,x}{L}\right)^2 rho\_z\sin\left(\frac{a\_rhoz\,\pi\,z}{L}\right)\\
&-v\_x^2\cos\left(\frac{a\_vx\,\pi\,x}{L}\right)^2 rho\_x\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)
\end{aligned}
$$

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\begin{aligned}
&- v\_x^2 \cos\left(\frac{a\_vx\,\pi\,x}{L}\right)^2 rho\_y \cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)\\
&- v\_y^2 \sin\left(\frac{a\_vy\,\pi\,y}{L}\right)^2 rho\_z \sin\left(\frac{a\_rhoz\,\pi\,z}{L}\right)\\
&- v\_y^2 \sin\left(\frac{a\_vy\,\pi\,y}{L}\right)^2 rho\_x \sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)\\
&- v\_y^2 \sin\left(\frac{a\_vy\,\pi\,y}{L}\right)^2 rho\_y \cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)\\
&- w\_z^2 \cos\left(\frac{a\_wz\,\pi\,z}{L}\right)^2 rho\_z \sin\left(\frac{a\_rhoz\,\pi\,z}{L}\right)\\
&- w\_z^2 \cos\left(\frac{a\_wz\,\pi\,z}{L}\right)^2 rho\_x \sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)\\
&- w\_z^2 \cos\left(\frac{a\_wz\,\pi\,z}{L}\right)^2 rho\_y \cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)\\
&- w\_x^2 \sin\left(\frac{a\_wx\,\pi\,x}{L}\right)^2 rho\_z \sin\left(\frac{a\_rhoz\,\pi\,z}{L}\right)\\
&- w\_x^2 \sin\left(\frac{a\_wx\,\pi\,x}{L}\right)^2 rho\_x \sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)\\
&- w\_x^2 \sin\left(\frac{a\_wx\,\pi\,x}{L}\right)^2 rho\_y \cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)\\
&- w\_y^2 \sin\left(\frac{a\_wy\,\pi\,y}{L}\right)^2 rho\_z \sin\left(\frac{a\_rhoz\,\pi\,z}{L}\right)\\
&- w\_y^2 \sin\left(\frac{a\_wy\,\pi\,y}{L}\right)^2 rho\_x \sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)\\
&- w\_y^2 \sin\left(\frac{a\_wy\,\pi\,y}{L}\right)^2 rho\_y \cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)\\
&+ 6\, u\_x \sin\left(\frac{a\_ux\,\pi\,x}{L}\right) u\_y \cos\left(\frac{a\_uy\,\pi\,y}{L}\right) \gamma\, rho\_z \sin\left(\frac{a\_rhoz\,\pi\,z}{L}\right)\\
&+ 6\, u\_x \sin\left(\frac{a\_ux\,\pi\,x}{L}\right) u\_y \cos\left(\frac{a\_uy\,\pi\,y}{L}\right) \gamma\, rho\_x \sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)\\
&+ 6\, u\_x \sin\left(\frac{a\_ux\,\pi\,x}{L}\right) u\_y \cos\left(\frac{a\_uy\,\pi\,y}{L}\right) \gamma\, rho\_y \cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)\\
&+ 6\, u\_x \sin\left(\frac{a\_ux\,\pi\,x}{L}\right) u\_z \cos\left(\frac{a\_uz\,\pi\,z}{L}\right) \gamma\, rho\_z \sin\left(\frac{a\_rhoz\,\pi\,z}{L}\right)\\
&+ 6\, u\_x \sin\left(\frac{a\_ux\,\pi\,x}{L}\right) u\_z \cos\left(\frac{a\_uz\,\pi\,z}{L}\right) \gamma\, rho\_x \sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)\\
&+ 6\, u\_x \sin\left(\frac{a\_ux\,\pi\,x}{L}\right) u\_z \cos\left(\frac{a\_uz\,\pi\,z}{L}\right) \gamma\, rho\_y \cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)\\
&+ 6\, u\_y \cos\left(\frac{a\_uy\,\pi\,y}{L}\right) u\_z \cos\left(\frac{a\_uz\,\pi\,z}{L}\right) \gamma\, rho\_z \sin\left(\frac{a\_rhoz\,\pi\,z}{L}\right)
\end{aligned}
$$

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\begin{aligned}
&+6\,u\_y\cos\left(\frac{a\_uy\,\pi\,y}{L}\right)\,u\_z\cos\left(\frac{a\_uz\,\pi\,z}{L}\right)\,\gamma\,rho\_x\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)\\
&+6\,u\_y\cos\left(\frac{a\_uy\,\pi\,y}{L}\right)\,u\_z\cos\left(\frac{a\_uz\,\pi\,z}{L}\right)\,\gamma\,rho\_y\cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)\\
&+2\,\gamma\,v\_z\sin\left(\frac{a\_vz\,\pi\,z}{L}\right)\,v\_x\cos\left(\frac{a\_vx\,\pi\,x}{L}\right)\,rho\_z\sin\left(\frac{a\_rhoz\,\pi\,z}{L}\right)\\
&+2\,\gamma\,v\_z\sin\left(\frac{a\_vz\,\pi\,z}{L}\right)\,v\_x\cos\left(\frac{a\_vx\,\pi\,x}{L}\right)\,rho\_x\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)\\
&+2\,\gamma\,v\_z\sin\left(\frac{a\_vz\,\pi\,z}{L}\right)\,v\_x\cos\left(\frac{a\_vx\,\pi\,x}{L}\right)\,rho\_y\cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)\\
&+2\,\gamma\,v\_z\sin\left(\frac{a\_vz\,\pi\,z}{L}\right)\,v\_y\sin\left(\frac{a\_vy\,\pi\,y}{L}\right)\,rho\_z\sin\left(\frac{a\_rhoz\,\pi\,z}{L}\right)\\
&+2\,\gamma\,v\_z\sin\left(\frac{a\_vz\,\pi\,z}{L}\right)\,v\_y\sin\left(\frac{a\_vy\,\pi\,y}{L}\right)\,rho\_x\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)\\
&+2\,\gamma\,v\_z\sin\left(\frac{a\_vz\,\pi\,z}{L}\right)\,v\_y\sin\left(\frac{a\_vy\,\pi\,y}{L}\right)\,rho\_y\cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)\\
&+2\,\gamma\,v\_x\cos\left(\frac{a\_vx\,\pi\,x}{L}\right)\,v\_y\sin\left(\frac{a\_vy\,\pi\,y}{L}\right)\,rho\_z\sin\left(\frac{a\_rhoz\,\pi\,z}{L}\right)\\
&+2\,\gamma\,v\_x\cos\left(\frac{a\_vx\,\pi\,x}{L}\right)\,v\_y\sin\left(\frac{a\_vy\,\pi\,y}{L}\right)\,rho\_x\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)\\
&+2\,\gamma\,v\_x\cos\left(\frac{a\_vx\,\pi\,x}{L}\right)\,v\_y\sin\left(\frac{a\_vy\,\pi\,y}{L}\right)\,rho\_y\cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)\\
&+2\,\gamma\,w\_z\cos\left(\frac{a\_wz\,\pi\,z}{L}\right)\,w\_x\sin\left(\frac{a\_wx\,\pi\,x}{L}\right)\,rho\_z\sin\left(\frac{a\_rhoz\,\pi\,z}{L}\right)\\
&+2\,\gamma\,w\_z\cos\left(\frac{a\_wz\,\pi\,z}{L}\right)\,w\_x\sin\left(\frac{a\_wx\,\pi\,x}{L}\right)\,rho\_x\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)\\
&+2\,\gamma\,w\_z\cos\left(\frac{a\_wz\,\pi\,z}{L}\right)\,w\_x\sin\left(\frac{a\_wx\,\pi\,x}{L}\right)\,rho\_y\cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)\\
&+2\,\gamma\,w\_z\cos\left(\frac{a\_wz\,\pi\,z}{L}\right)\,w\_y\sin\left(\frac{a\_wy\,\pi\,y}{L}\right)\,rho\_z\sin\left(\frac{a\_rhoz\,\pi\,z}{L}\right)\\
&+2\,\gamma\,w\_z\cos\left(\frac{a\_wz\,\pi\,z}{L}\right)\,w\_y\sin\left(\frac{a\_wy\,\pi\,y}{L}\right)\,rho\_x\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)\\
&+2\,\gamma\,w\_z\cos\left(\frac{a\_wz\,\pi\,z}{L}\right)\,w\_y\sin\left(\frac{a\_wy\,\pi\,y}{L}\right)\,rho\_y\cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)\\
&+2\,\gamma\,w\_x\sin\left(\frac{a\_wx\,\pi\,x}{L}\right)\,w\_y\sin\left(\frac{a\_wy\,\pi\,y}{L}\right)\,rho\_z\sin\left(\frac{a\_rhoz\,\pi\,z}{L}\right)\\
&+2\,\gamma\,w\_x\sin\left(\frac{a\_wx\,\pi\,x}{L}\right)\,w\_y\sin\left(\frac{a\_wy\,\pi\,y}{L}\right)\,rho\_x\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)\\
&+2\,\gamma\,w\_x\sin\left(\frac{a\_wx\,\pi\,x}{L}\right)\,w\_y\sin\left(\frac{a\_wy\,\pi\,y}{L}\right)\,rho\_y\cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)
\end{aligned}
$$

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\begin{aligned}
&-6\,u\_x\sin\left(\frac{a\_ux\pi\,x}{L}\right)u\_y\cos\left(\frac{a\_uy\pi\,y}{L}\right)rho\_z\sin\left(\frac{a\_rhoz\pi\,z}{L}\right)\\
&-6\,u\_x\sin\left(\frac{a\_ux\pi\,x}{L}\right)u\_y\cos\left(\frac{a\_uy\pi\,y}{L}\right)rho\_x\sin\left(\frac{a\_rhox\pi\,x}{L}\right)\\
&-6\,u\_x\sin\left(\frac{a\_ux\pi\,x}{L}\right)u\_y\cos\left(\frac{a\_uy\pi\,y}{L}\right)rho\_y\cos\left(\frac{a\_rhoy\pi\,y}{L}\right)\\
&-6\,u\_x\sin\left(\frac{a\_ux\pi\,x}{L}\right)u\_z\cos\left(\frac{a\_uz\pi\,z}{L}\right)rho\_z\sin\left(\frac{a\_rhoz\pi\,z}{L}\right)\\
&-6\,u\_x\sin\left(\frac{a\_ux\pi\,x}{L}\right)u\_z\cos\left(\frac{a\_uz\pi\,z}{L}\right)rho\_x\sin\left(\frac{a\_rhox\pi\,x}{L}\right)\\
&-6\,u\_x\sin\left(\frac{a\_ux\pi\,x}{L}\right)u\_z\cos\left(\frac{a\_uz\pi\,z}{L}\right)rho\_y\cos\left(\frac{a\_rhoy\pi\,y}{L}\right)\\
&-6\,u\_y\cos\left(\frac{a\_uy\pi\,y}{L}\right)u\_z\cos\left(\frac{a\_uz\pi\,z}{L}\right)rho\_z\sin\left(\frac{a\_rhoz\pi\,z}{L}\right)\\
&-6\,u\_y\cos\left(\frac{a\_uy\pi\,y}{L}\right)u\_z\cos\left(\frac{a\_uz\pi\,z}{L}\right)rho\_x\sin\left(\frac{a\_rhox\pi\,x}{L}\right)\\
&-6\,u\_y\cos\left(\frac{a\_uy\pi\,y}{L}\right)u\_z\cos\left(\frac{a\_uz\pi\,z}{L}\right)rho\_y\cos\left(\frac{a\_rhoy\pi\,y}{L}\right)\\
&+6\,u\_0\,u\_x\sin\left(\frac{a\_ux\pi\,x}{L}\right)\gamma\,rho\_z\sin\left(\frac{a\_rhoz\pi\,z}{L}\right)\\
&+6\,u\_0\,u\_x\sin\left(\frac{a\_ux\pi\,x}{L}\right)\gamma\,rho\_x\sin\left(\frac{a\_rhox\pi\,x}{L}\right)\\
&+6\,u\_0\,u\_x\sin\left(\frac{a\_ux\pi\,x}{L}\right)\gamma\,rho\_y\cos\left(\frac{a\_rhoy\pi\,y}{L}\right)\\
&+6\,u\_0\,u\_z\cos\left(\frac{a\_uz\pi\,z}{L}\right)\gamma\,rho\_z\sin\left(\frac{a\_rhoz\pi\,z}{L}\right)\\
&+6\,u\_0\,u\_z\cos\left(\frac{a\_uz\pi\,z}{L}\right)\gamma\,rho\_x\sin\left(\frac{a\_rhox\pi\,x}{L}\right)\\
&+6\,u\_0\,u\_z\cos\left(\frac{a\_uz\pi\,z}{L}\right)\gamma\,rho\_y\cos\left(\frac{a\_rhoy\pi\,y}{L}\right)\\
&+6\,u\_0\,u\_y\cos\left(\frac{a\_uy\pi\,y}{L}\right)\gamma\,rho\_z\sin\left(\frac{a\_rhoz\pi\,z}{L}\right)\\
&+6\,u\_0\,u\_y\cos\left(\frac{a\_uy\pi\,y}{L}\right)\gamma\,rho\_x\sin\left(\frac{a\_rhox\pi\,x}{L}\right)\\
&+6\,u\_0\,u\_y\cos\left(\frac{a\_uy\pi\,y}{L}\right)\gamma\,rho\_y\cos\left(\frac{a\_rhoy\pi\,y}{L}\right)\\
&+6\,u\_x\sin\left(\frac{a\_ux\pi\,x}{L}\right)u\_y\cos\left(\frac{a\_uy\pi\,y}{L}\right)\gamma\,rho\_0\\
&+6\,u\_x\sin\left(\frac{a\_ux\pi\,x}{L}\right)u\_z\cos\left(\frac{a\_uz\pi\,z}{L}\right)\gamma\,rho\_0
\end{aligned}
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\begin{aligned}
&+ 6\, u\_y \cos\left(\frac{a\_uy\,\pi\, y}{L}\right) u\_z \cos\left(\frac{a\_uz\,\pi\, z}{L}\right) \gamma\, rho\_0 \\
&+ 2\,\gamma\, v\_z \sin\left(\frac{a\_vz\,\pi\, z}{L}\right) v\_0\, rho\_z \sin\left(\frac{a\_rhoz\,\pi\, z}{L}\right) \\
&+ 2\,\gamma\, v\_z \sin\left(\frac{a\_vz\,\pi\, z}{L}\right) v\_0\, rho\_x \sin\left(\frac{a\_rhox\,\pi\, x}{L}\right) \\
&+ 2\,\gamma\, v\_z \sin\left(\frac{a\_vz\,\pi\, z}{L}\right) v\_0\, rho\_y \cos\left(\frac{a\_rhoy\,\pi\, y}{L}\right) \\
&+ 2\,\gamma\, v\_0\, v\_x \cos\left(\frac{a\_vx\,\pi\, x}{L}\right) rho\_z \sin\left(\frac{a\_rhoz\,\pi\, z}{L}\right) \\
&+ 2\,\gamma\, v\_0\, v\_x \cos\left(\frac{a\_vx\,\pi\, x}{L}\right) rho\_x \sin\left(\frac{a\_rhox\,\pi\, x}{L}\right) \\
&+ 2\,\gamma\, v\_0\, v\_x \cos\left(\frac{a\_vx\,\pi\, x}{L}\right) rho\_y \cos\left(\frac{a\_rhoy\,\pi\, y}{L}\right) \\
&+ 2\,\gamma\, v\_0\, v\_y \sin\left(\frac{a\_vy\,\pi\, y}{L}\right) rho\_z \sin\left(\frac{a\_rhoz\,\pi\, z}{L}\right) \\
&+ 2\,\gamma\, v\_0\, v\_y \sin\left(\frac{a\_vy\,\pi\, y}{L}\right) rho\_x \sin\left(\frac{a\_rhox\,\pi\, x}{L}\right) \\
&+ 2\,\gamma\, v\_0\, v\_y \sin\left(\frac{a\_vy\,\pi\, y}{L}\right) rho\_y \cos\left(\frac{a\_rhoy\,\pi\, y}{L}\right) \\
&- 2\, v\_z \sin\left(\frac{a\_vz\,\pi\, z}{L}\right) v\_x \cos\left(\frac{a\_vx\,\pi\, x}{L}\right) rho\_z \sin\left(\frac{a\_rhoz\,\pi\, z}{L}\right) \\
&- 2\, v\_z \sin\left(\frac{a\_vz\,\pi\, z}{L}\right) v\_x \cos\left(\frac{a\_vx\,\pi\, x}{L}\right) rho\_x \sin\left(\frac{a\_rhox\,\pi\, x}{L}\right) \\
&- 2\, v\_z \sin\left(\frac{a\_vz\,\pi\, z}{L}\right) v\_x \cos\left(\frac{a\_vx\,\pi\, x}{L}\right) rho\_y \cos\left(\frac{a\_rhoy\,\pi\, y}{L}\right) \\
&- 2\, v\_z \sin\left(\frac{a\_vz\,\pi\, z}{L}\right) v\_y \sin\left(\frac{a\_vy\,\pi\, y}{L}\right) rho\_z \sin\left(\frac{a\_rhoz\,\pi\, z}{L}\right) \\
&- 2\, v\_z \sin\left(\frac{a\_vz\,\pi\, z}{L}\right) v\_y \sin\left(\frac{a\_vy\,\pi\, y}{L}\right) rho\_x \sin\left(\frac{a\_rhox\,\pi\, x}{L}\right) \\
&- 2\, v\_z \sin\left(\frac{a\_vz\,\pi\, z}{L}\right) v\_y \sin\left(\frac{a\_vy\,\pi\, y}{L}\right) rho\_y \cos\left(\frac{a\_rhoy\,\pi\, y}{L}\right) \\
&- 2\, v\_x \cos\left(\frac{a\_vx\,\pi\, x}{L}\right) v\_y \sin\left(\frac{a\_vy\,\pi\, y}{L}\right) rho\_z \sin\left(\frac{a\_rhoz\,\pi\, z}{L}\right) \\
&- 2\, v\_x \cos\left(\frac{a\_vx\,\pi\, x}{L}\right) v\_y \sin\left(\frac{a\_vy\,\pi\, y}{L}\right) rho\_x \sin\left(\frac{a\_rhox\,\pi\, x}{L}\right) \\
&- 2\, v\_x \cos\left(\frac{a\_vx\,\pi\, x}{L}\right) v\_y \sin\left(\frac{a\_vy\,\pi\, y}{L}\right) rho\_y \cos\left(\frac{a\_rhoy\,\pi\, y}{L}\right) \\
&- 2\, w\_z \cos\left(\frac{a\_wz\,\pi\, z}{L}\right) w\_x \sin\left(\frac{a\_wx\,\pi\, x}{L}\right) rho\_z \sin\left(\frac{a\_rhoz\,\pi\, z}{L}\right)
\end{aligned}
$$

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\begin{aligned}
&-2\, w\_z \cos\left(\frac{a\_wz\,\pi\, z}{L}\right) w\_x \sin\left(\frac{a\_wx\,\pi\, x}{L}\right) rho\_x \sin\left(\frac{a\_rhox\,\pi\, x}{L}\right)\\
&-2\, w\_z \cos\left(\frac{a\_wz\,\pi\, z}{L}\right) w\_x \sin\left(\frac{a\_wx\,\pi\, x}{L}\right) rho\_y \cos\left(\frac{a\_rhoy\,\pi\, y}{L}\right)\\
&-2\, w\_z \cos\left(\frac{a\_wz\,\pi\, z}{L}\right) w\_y \sin\left(\frac{a\_wy\,\pi\, y}{L}\right) rho\_z \sin\left(\frac{a\_rhoz\,\pi\, z}{L}\right)\\
&-2\, w\_z \cos\left(\frac{a\_wz\,\pi\, z}{L}\right) w\_y \sin\left(\frac{a\_wy\,\pi\, y}{L}\right) rho\_x \sin\left(\frac{a\_rhox\,\pi\, x}{L}\right)\\
&-2\, w\_z \cos\left(\frac{a\_wz\,\pi\, z}{L}\right) w\_y \sin\left(\frac{a\_wy\,\pi\, y}{L}\right) rho\_y \cos\left(\frac{a\_rhoy\,\pi\, y}{L}\right)\\
&-2\, w\_x \sin\left(\frac{a\_wx\,\pi\, x}{L}\right) w\_y \sin\left(\frac{a\_wy\,\pi\, y}{L}\right) rho\_z \sin\left(\frac{a\_rhoz\,\pi\, z}{L}\right)\\
&-2\, w\_x \sin\left(\frac{a\_wx\,\pi\, x}{L}\right) w\_y \sin\left(\frac{a\_wy\,\pi\, y}{L}\right) rho\_x \sin\left(\frac{a\_rhox\,\pi\, x}{L}\right)\\
&-2\, w\_x \sin\left(\frac{a\_wx\,\pi\, x}{L}\right) w\_y \sin\left(\frac{a\_wy\,\pi\, y}{L}\right) rho\_y \cos\left(\frac{a\_rhoy\,\pi\, y}{L}\right)\\
&+2\,\gamma\, w\_z \cos\left(\frac{a\_wz\,\pi\, z}{L}\right) w\_0\, rho\_z \sin\left(\frac{a\_rhoz\,\pi\, z}{L}\right)\\
&+2\,\gamma\, w\_z \cos\left(\frac{a\_wz\,\pi\, z}{L}\right) w\_0\, rho\_x \sin\left(\frac{a\_rhox\,\pi\, x}{L}\right)\\
&+2\,\gamma\, w\_z \cos\left(\frac{a\_wz\,\pi\, z}{L}\right) w\_0\, rho\_y \cos\left(\frac{a\_rhoy\,\pi\, y}{L}\right)\\
&+2\,\gamma\, w\_0\, w\_x \sin\left(\frac{a\_wx\,\pi\, x}{L}\right) rho\_z \sin\left(\frac{a\_rhoz\,\pi\, z}{L}\right)\\
&+2\,\gamma\, w\_0\, w\_x \sin\left(\frac{a\_wx\,\pi\, x}{L}\right) rho\_x \sin\left(\frac{a\_rhox\,\pi\, x}{L}\right)\\
&+2\,\gamma\, w\_0\, w\_x \sin\left(\frac{a\_wx\,\pi\, x}{L}\right) rho\_y \cos\left(\frac{a\_rhoy\,\pi\, y}{L}\right)\\
&+2\,\gamma\, w\_0\, w\_y \sin\left(\frac{a\_wy\,\pi\, y}{L}\right) rho\_z \sin\left(\frac{a\_rhoz\,\pi\, z}{L}\right)\\
&+2\,\gamma\, w\_0\, w\_y \sin\left(\frac{a\_wy\,\pi\, y}{L}\right) rho\_x \sin\left(\frac{a\_rhox\,\pi\, x}{L}\right)\\
&+2\,\gamma\, w\_0\, w\_y \sin\left(\frac{a\_wy\,\pi\, y}{L}\right) rho\_y \cos\left(\frac{a\_rhoy\,\pi\, y}{L}\right)\\
&+2\,\gamma\, v\_z \sin\left(\frac{a\_vz\,\pi\, z}{L}\right) v\_x \cos\left(\frac{a\_vx\,\pi\, x}{L}\right) rho\_0\\
&+2\,\gamma\, v\_z \sin\left(\frac{a\_vz\,\pi\, z}{L}\right) v\_y \sin\left(\frac{a\_vy\,\pi\, y}{L}\right) rho\_0\\
&+2\,\gamma\, v\_x \cos\left(\frac{a\_vx\,\pi\, x}{L}\right) v\_y \sin\left(\frac{a\_vy\,\pi\, y}{L}\right) rho\_0
\end{aligned}
$$

$$
\begin{aligned}
&+2\,\gamma\,w\_z\cos\left(\frac{a\_wz\,\pi\,z}{L}\right)\,w\_x\sin\left(\frac{a\_wx\,\pi\,x}{L}\right)\,rho\_0\\
&+2\,\gamma\,w\_z\cos\left(\frac{a\_wz\,\pi\,z}{L}\right)\,w\_y\sin\left(\frac{a\_wy\,\pi\,y}{L}\right)\,rho\_0\\
&+2\,\gamma\,w\_x\sin\left(\frac{a\_wx\,\pi\,x}{L}\right)\,w\_y\sin\left(\frac{a\_wy\,\pi\,y}{L}\right)\,rho\_0\\
&-6\,u\_x\sin\left(\frac{a\_ux\,\pi\,x}{L}\right)\,u\_y\cos\left(\frac{a\_uy\,\pi\,y}{L}\right)\,rho\_0\\
&-6\,u\_x\sin\left(\frac{a\_ux\,\pi\,x}{L}\right)\,u\_z\cos\left(\frac{a\_uz\,\pi\,z}{L}\right)\,rho\_0\\
&-6\,u\_y\cos\left(\frac{a\_uy\,\pi\,y}{L}\right)\,u\_z\cos\left(\frac{a\_uz\,\pi\,z}{L}\right)\,rho\_0\\
&+6\,u\_0\,u\_x\sin\left(\frac{a\_ux\,\pi\,x}{L}\right)\,\gamma\,rho\_0+6\,u\_0\,u\_z\cos\left(\frac{a\_uz\,\pi\,z}{L}\right)\,\gamma\,rho\_0\\
&+6\,u\_0\,u\_y\cos\left(\frac{a\_uy\,\pi\,y}{L}\right)\,\gamma\,rho\_0\\
&-6\,u\_0\,u\_x\sin\left(\frac{a\_ux\,\pi\,x}{L}\right)\,rho\_z\sin\left(\frac{a\_rhoz\,\pi\,z}{L}\right)\\
&-6\,u\_0\,u\_x\sin\left(\frac{a\_ux\,\pi\,x}{L}\right)\,rho\_x\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)\\
&-6\,u\_0\,u\_x\sin\left(\frac{a\_ux\,\pi\,x}{L}\right)\,rho\_y\cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)\\
&-6\,u\_0\,u\_y\cos\left(\frac{a\_uy\,\pi\,y}{L}\right)\,rho\_z\sin\left(\frac{a\_rhoz\,\pi\,z}{L}\right)\\
&-6\,u\_0\,u\_y\cos\left(\frac{a\_uy\,\pi\,y}{L}\right)\,rho\_x\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)\\
&-6\,u\_0\,u\_y\cos\left(\frac{a\_uy\,\pi\,y}{L}\right)\,rho\_y\cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)\\
&-6\,u\_0\,u\_z\cos\left(\frac{a\_uz\,\pi\,z}{L}\right)\,rho\_z\sin\left(\frac{a\_rhoz\,\pi\,z}{L}\right)\\
&-6\,u\_0\,u\_z\cos\left(\frac{a\_uz\,\pi\,z}{L}\right)\,rho\_x\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)\\
&-6\,u\_0\,u\_z\cos\left(\frac{a\_uz\,\pi\,z}{L}\right)\,rho\_y\cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)\\
&+3\,u\_x^2\sin\left(\frac{a\_ux\,\pi\,x}{L}\right)^2\,\gamma\,rho\_z\sin\left(\frac{a\_rhoz\,\pi\,z}{L}\right)\\
&+3\,u\_x^2\sin\left(\frac{a\_ux\,\pi\,x}{L}\right)^2\,\gamma\,rho\_x\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)\\
&+3\,u\_x^2\sin\left(\frac{a\_ux\,\pi\,x}{L}\right)^2\,\gamma\,rho\_y\cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)
\end{aligned}
$$

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\begin{aligned}
&+3\,u\_y^2\cos\left(\frac{a\_uy\,\pi\,y}{L}\right)^2\gamma\,rho\_z\sin\left(\frac{a\_rhoz\,\pi\,z}{L}\right)\\
&+3\,u\_y^2\cos\left(\frac{a\_uy\,\pi\,y}{L}\right)^2\gamma\,rho\_x\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)\\
&+3\,u\_y^2\cos\left(\frac{a\_uy\,\pi\,y}{L}\right)^2\gamma\,rho\_y\cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)\\
&+3\,u\_z^2\cos\left(\frac{a\_uz\,\pi\,z}{L}\right)^2\gamma\,rho\_z\sin\left(\frac{a\_rhoz\,\pi\,z}{L}\right)\\
&+3\,u\_z^2\cos\left(\frac{a\_uz\,\pi\,z}{L}\right)^2\gamma\,rho\_x\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)\\
&+3\,u\_z^2\cos\left(\frac{a\_uz\,\pi\,z}{L}\right)^2\gamma\,rho\_y\cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)\\
&+2\,\gamma\,v\_z\sin\left(\frac{a\_vz\,\pi\,z}{L}\right)v\_0\,rho\_0+2\,\gamma\,v\_0\,v\_x\cos\left(\frac{a\_vx\,\pi\,x}{L}\right)rho\_0\\
&+2\,\gamma\,v\_0\,v\_y\sin\left(\frac{a\_vy\,\pi\,y}{L}\right)rho\_0\\
&-2\,v\_z\sin\left(\frac{a\_vz\,\pi\,z}{L}\right)v\_x\cos\left(\frac{a\_vx\,\pi\,x}{L}\right)rho\_0\\
&-2\,v\_z\sin\left(\frac{a\_vz\,\pi\,z}{L}\right)v\_y\sin\left(\frac{a\_vy\,\pi\,y}{L}\right)rho\_0\\
&-2\,v\_x\cos\left(\frac{a\_vx\,\pi\,x}{L}\right)v\_y\sin\left(\frac{a\_vy\,\pi\,y}{L}\right)rho\_0\\
&+\gamma\,v\_z^2\sin\left(\frac{a\_vz\,\pi\,z}{L}\right)^2rho\_z\sin\left(\frac{a\_rhoz\,\pi\,z}{L}\right)\\
&+\gamma\,v\_z^2\sin\left(\frac{a\_vz\,\pi\,z}{L}\right)^2rho\_x\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)\\
&+\gamma\,v\_z^2\sin\left(\frac{a\_vz\,\pi\,z}{L}\right)^2rho\_y\cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)\\
&+\gamma\,v\_x^2\cos\left(\frac{a\_vx\,\pi\,x}{L}\right)^2rho\_z\sin\left(\frac{a\_rhoz\,\pi\,z}{L}\right)\\
&+\gamma\,v\_x^2\cos\left(\frac{a\_vx\,\pi\,x}{L}\right)^2rho\_x\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)\\
&+\gamma\,v\_x^2\cos\left(\frac{a\_vx\,\pi\,x}{L}\right)^2rho\_y\cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)\\
&+\gamma\,v\_y^2\sin\left(\frac{a\_vy\,\pi\,y}{L}\right)^2rho\_z\sin\left(\frac{a\_rhoz\,\pi\,z}{L}\right)\\
&+\gamma\,v\_y^2\sin\left(\frac{a\_vy\,\pi\,y}{L}\right)^2rho\_x\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)\\
&+\gamma\,v\_y^2\sin\left(\frac{a\_vy\,\pi\,y}{L}\right)^2rho\_y\cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)
\end{aligned}
$$

$$
\begin{aligned}
&-2\, w\_z \cos\left(\frac{a\_wz\,\pi\, z}{L}\right) w\_x \sin\left(\frac{a\_wx\,\pi\, x}{L}\right) rho\_0 \\
&-2\, w\_z \cos\left(\frac{a\_wz\,\pi\, z}{L}\right) w\_y \sin\left(\frac{a\_wy\,\pi\, y}{L}\right) rho\_0 \\
&-2\, w\_x \sin\left(\frac{a\_wx\,\pi\, x}{L}\right) w\_y \sin\left(\frac{a\_wy\,\pi\, y}{L}\right) rho\_0 \\
&+2\,\gamma\, w\_z \cos\left(\frac{a\_wz\,\pi\, z}{L}\right) w\_0\, rho\_0 + 2\,\gamma\, w\_0\, w\_x \sin\left(\frac{a\_wx\,\pi\, x}{L}\right) rho\_0 \\
&+2\,\gamma\, w\_0\, w\_y \sin\left(\frac{a\_wy\,\pi\, y}{L}\right) rho\_0 \\
&+\gamma\, w\_z^2 \cos\left(\frac{a\_wz\,\pi\, z}{L}\right)^2 rho\_z \sin\left(\frac{a\_rhoz\,\pi\, z}{L}\right) \\
&+\gamma\, w\_z^2 \cos\left(\frac{a\_wz\,\pi\, z}{L}\right)^2 rho\_x \sin\left(\frac{a\_rhox\,\pi\, x}{L}\right) \\
&+\gamma\, w\_z^2 \cos\left(\frac{a\_wz\,\pi\, z}{L}\right)^2 rho\_y \cos\left(\frac{a\_rhoy\,\pi\, y}{L}\right) \\
&+\gamma\, w\_x^2 \sin\left(\frac{a\_wx\,\pi\, x}{L}\right)^2 rho\_z \sin\left(\frac{a\_rhoz\,\pi\, z}{L}\right) \\
&+\gamma\, w\_x^2 \sin\left(\frac{a\_wx\,\pi\, x}{L}\right)^2 rho\_x \sin\left(\frac{a\_rhox\,\pi\, x}{L}\right) \\
&+\gamma\, w\_x^2 \sin\left(\frac{a\_wx\,\pi\, x}{L}\right)^2 rho\_y \cos\left(\frac{a\_rhoy\,\pi\, y}{L}\right) \\
&+\gamma\, w\_y^2 \sin\left(\frac{a\_wy\,\pi\, y}{L}\right)^2 rho\_z \sin\left(\frac{a\_rhoz\,\pi\, z}{L}\right) \\
&+\gamma\, w\_y^2 \sin\left(\frac{a\_wy\,\pi\, y}{L}\right)^2 rho\_x \sin\left(\frac{a\_rhox\,\pi\, x}{L}\right) \\
&+\gamma\, w\_y^2 \sin\left(\frac{a\_wy\,\pi\, y}{L}\right)^2 rho\_y \cos\left(\frac{a\_rhoy\,\pi\, y}{L}\right) \\
&-2\, v\_z \sin\left(\frac{a\_vz\,\pi\, z}{L}\right) v\_0\, rho\_z \sin\left(\frac{a\_rhoz\,\pi\, z}{L}\right) \\
&-2\, v\_z \sin\left(\frac{a\_vz\,\pi\, z}{L}\right) v\_0\, rho\_x \sin\left(\frac{a\_rhox\,\pi\, x}{L}\right) \\
&-2\, v\_z \sin\left(\frac{a\_vz\,\pi\, z}{L}\right) v\_0\, rho\_y \cos\left(\frac{a\_rhoy\,\pi\, y}{L}\right) \\
&-2\, v\_0\, v\_x \cos\left(\frac{a\_vx\,\pi\, x}{L}\right) rho\_z \sin\left(\frac{a\_rhoz\,\pi\, z}{L}\right) \\
&-2\, v\_0\, v\_x \cos\left(\frac{a\_vx\,\pi\, x}{L}\right) rho\_x \sin\left(\frac{a\_rhox\,\pi\, x}{L}\right) \\
&-2\, v\_0\, v\_x \cos\left(\frac{a\_vx\,\pi\, x}{L}\right) rho\_y \cos\left(\frac{a\_rhoy\,\pi\, y}{L}\right)
\end{aligned}
$$

$$
\begin{aligned}
&-2\ v\_0\, v\_y \sin\left(\frac{a\_vy\,\pi\, y}{L}\right) rho\_z \sin\left(\frac{a\_rhoz\,\pi\, z}{L}\right)\\
&-2\ v\_0\, v\_y \sin\left(\frac{a\_vy\,\pi\, y}{L}\right) rho\_x \sin\left(\frac{a\_rhox\,\pi\, x}{L}\right)\\
&-2\ v\_0\, v\_y \sin\left(\frac{a\_vy\,\pi\, y}{L}\right) rho\_y \cos\left(\frac{a\_rhoy\,\pi\, y}{L}\right)\\
&-2\ w\_z \cos\left(\frac{a\_wz\,\pi\, z}{L}\right) w\_0\, rho\_z \sin\left(\frac{a\_rhoz\,\pi\, z}{L}\right)\\
&-2\ w\_z \cos\left(\frac{a\_wz\,\pi\, z}{L}\right) w\_0\, rho\_x \sin\left(\frac{a\_rhox\,\pi\, x}{L}\right)\\
&-2\ w\_z \cos\left(\frac{a\_wz\,\pi\, z}{L}\right) w\_0\, rho\_y \cos\left(\frac{a\_rhoy\,\pi\, y}{L}\right)\\
&-2\ w\_0\, w\_x \sin\left(\frac{a\_wx\,\pi\, x}{L}\right) rho\_z \sin\left(\frac{a\_rhoz\,\pi\, z}{L}\right)\\
&-2\ w\_0\, w\_x \sin\left(\frac{a\_wx\,\pi\, x}{L}\right) rho\_x \sin\left(\frac{a\_rhox\,\pi\, x}{L}\right)\\
&-2\ w\_0\, w\_x \sin\left(\frac{a\_wx\,\pi\, x}{L}\right) rho\_y \cos\left(\frac{a\_rhoy\,\pi\, y}{L}\right)\\
&-2\ w\_0\, w\_y \sin\left(\frac{a\_wy\,\pi\, y}{L}\right) rho\_z \sin\left(\frac{a\_rhoz\,\pi\, z}{L}\right)\\
&-2\ w\_0\, w\_y \sin\left(\frac{a\_wy\,\pi\, y}{L}\right) rho\_x \sin\left(\frac{a\_rhox\,\pi\, x}{L}\right)\\
&-2\ w\_0\, w\_y \sin\left(\frac{a\_wy\,\pi\, y}{L}\right) rho\_y \cos\left(\frac{a\_rhoy\,\pi\, y}{L}\right)\Bigg)\\
&u\_x \cos\left(\frac{a\_ux\,\pi\, x}{L}\right) a\_ux\,\pi\Bigg) - \Bigg(\left(v\_0 + v\_x \cos\left(\frac{a\_vx\,\pi\, x}{L}\right)\right.\\
&\left. + v\_y \sin\left(\frac{a\_vy\,\pi\, y}{L}\right) + v\_z \sin\left(\frac{a\_vz\,\pi\, z}{L}\right)\right)\Bigg(\\
&-\sin\left(\frac{a\_uy\,\pi\, y}{L}\right) u\_y \left(rho\_0 + rho\_x \sin\left(\frac{a\_rhox\,\pi\, x}{L}\right)\right.\\
&\left. + rho\_y \cos\left(\frac{a\_rhoy\,\pi\, y}{L}\right) + rho\_z \sin\left(\frac{a\_rhoz\,\pi\, z}{L}\right)\right)^2 \left(u\_0\right.\\
&\left. + u\_x \sin\left(\frac{a\_ux\,\pi\, x}{L}\right) + u\_y \cos\left(\frac{a\_uy\,\pi\, y}{L}\right) + u\_z \cos\left(\frac{a\_uz\,\pi\, z}{L}\right)\right)\\
&+\sin\left(\frac{a\_uy\,\pi\, y}{L}\right) u\_y \left(rho\_0 + rho\_x \sin\left(\frac{a\_rhox\,\pi\, x}{L}\right)\right.\\
&\left. + rho\_y \cos\left(\frac{a\_rhoy\,\pi\, y}{L}\right) + rho\_z \sin\left(\frac{a\_rhoz\,\pi\, z}{L}\right)\right)^2 \left(u\_0\right.\\
&\left. + u\_x \sin\left(\frac{a\_ux\,\pi\, x}{L}\right) + u\_y \cos\left(\frac{a\_uy\,\pi\, y}{L}\right) + u\_z \cos\left(\frac{a\_uz\,\pi\, z}{L}\right)\right)\gamma\Bigg)\, a\_uy\,\pi\Bigg)
\end{aligned}
$$

$$
\Bigg/ \left((\gamma - 1)\, L \left(rho\_0 + rho\_x \sin\left(\frac{a\_rhox\, \pi\, x}{L} \right) + rho\_y \cos\left(\frac{a\_rhoy\, \pi\, y}{L} \right) \right.\right.
$$
$$
\left.\left. + rho\_z \sin\left(\frac{a\_rhoz\, \pi\, z}{L} \right) \right) \right) - \left(\left(w\_0 + w\_x \sin\left(\frac{a\_wx\, \pi\, x}{L} \right) \right.\right.
$$
$$
\left.\left. + w\_y \sin\left(\frac{a\_wy\, \pi\, y}{L} \right) + w\_z \cos\left(\frac{a\_wz\, \pi\, z}{L} \right) \right) \right) \left(\right.
$$
$$
- \sin\left(\frac{a\_uz\, \pi\, z}{L} \right) u\_z \left(rho\_0 + rho\_x \sin\left(\frac{a\_rhox\, \pi\, x}{L} \right) \right.
$$
$$
\left. + rho\_y \cos\left(\frac{a\_rhoy\, \pi\, y}{L} \right) + rho\_z \sin\left(\frac{a\_rhoz\, \pi\, z}{L} \right) \right)^2 \left(u\_0 \right.
$$
$$
\left. + u\_x \sin\left(\frac{a\_ux\, \pi\, x}{L} \right) + u\_y \cos\left(\frac{a\_uy\, \pi\, y}{L} \right) + u\_z \cos\left(\frac{a\_uz\, \pi\, z}{L} \right) \right)
$$
$$
+ \sin\left(\frac{a\_uz\, \pi\, z}{L} \right) u\_z \left(rho\_0 + rho\_x \sin\left(\frac{a\_rhox\, \pi\, x}{L} \right) \right.
$$
$$
\left. + rho\_y \cos\left(\frac{a\_rhoy\, \pi\, y}{L} \right) + rho\_z \sin\left(\frac{a\_rhoz\, \pi\, z}{L} \right) \right)^2 \left(u\_0 \right.
$$
$$
\left. \left. + u\_x \sin\left(\frac{a\_ux\, \pi\, x}{L} \right) + u\_y \cos\left(\frac{a\_uy\, \pi\, y}{L} \right) + u\_z \cos\left(\frac{a\_uz\, \pi\, z}{L} \right) \right) \gamma \right) a\_uz\, \pi \Bigg)
$$
$$
\Bigg/ \left((\gamma - 1)\, L \left(rho\_0 + rho\_x \sin\left(\frac{a\_rhox\, \pi\, x}{L} \right) + rho\_y \cos\left(\frac{a\_rhoy\, \pi\, y}{L} \right) \right.\right.
$$
$$
\left.\left. + rho\_z \sin\left(\frac{a\_rhoz\, \pi\, z}{L} \right) \right) \right) - \left(\left(u\_0 + u\_x \sin\left(\frac{a\_ux\, \pi\, x}{L} \right) \right.\right.
$$
$$
\left.\left. + u\_y \cos\left(\frac{a\_uy\, \pi\, y}{L} \right) + u\_z \cos\left(\frac{a\_uz\, \pi\, z}{L} \right) \right) \right) \left(\right.
$$
$$
- \sin\left(\frac{a\_vx\, \pi\, x}{L} \right) v\_x \left(rho\_0 + rho\_x \sin\left(\frac{a\_rhox\, \pi\, x}{L} \right) \right.
$$
$$
\left. + rho\_y \cos\left(\frac{a\_rhoy\, \pi\, y}{L} \right) + rho\_z \sin\left(\frac{a\_rhoz\, \pi\, z}{L} \right) \right)^2 \left(v\_0 \right.
$$
$$
\left. + v\_x \cos\left(\frac{a\_vx\, \pi\, x}{L} \right) + v\_y \sin\left(\frac{a\_vy\, \pi\, y}{L} \right) + v\_z \sin\left(\frac{a\_vz\, \pi\, z}{L} \right) \right)
$$
$$
+ \sin\left(\frac{a\_vx\, \pi\, x}{L} \right) v\_x \left(rho\_0 + rho\_x \sin\left(\frac{a\_rhox\, \pi\, x}{L} \right) \right.
$$
$$
\left. + rho\_y \cos\left(\frac{a\_rhoy\, \pi\, y}{L} \right) + rho\_z \sin\left(\frac{a\_rhoz\, \pi\, z}{L} \right) \right)^2 \left(v\_0 \right.
$$
$$
\left. \left. + v\_x \cos\left(\frac{a\_vx\, \pi\, x}{L} \right) + v\_y \sin\left(\frac{a\_vy\, \pi\, y}{L} \right) + v\_z \sin\left(\frac{a\_vz\, \pi\, z}{L} \right) \right) \gamma \right) a\_vx\, \pi \Bigg)
$$
$$
\Bigg/ \left((\gamma - 1)\, L \left(rho\_0 + rho\_x \sin\left(\frac{a\_rhox\, \pi\, x}{L} \right) + rho\_y \cos\left(\frac{a\_rhoy\, \pi\, y}{L} \right) \right.\right.
$$
$$
\left.\left. + rho\_z \sin\left(\frac{a\_rhoz\, \pi\, z}{L} \right) \right) \right) + \frac{1}{2} \frac{1}{L\, (\gamma - 1)} \left(\left(2\, p\_x \cos\left(\frac{a\_px\, \pi\, x}{L} \right) \gamma \right.\right.
$$

$$
\begin{aligned}
&+2\,p\_y\sin\left(\frac{a\_py\,\pi\,y}{L}\right)\gamma+2\,p\_z\cos\left(\frac{a\_pz\,\pi\,z}{L}\right)\gamma+2\,p\_0\,\gamma-u\_0^2\,rho\_0\\
&-3\,v\_0^2\,rho\_0-w\_0^2\,rho\_0-u\_0^2\,rho\_z\sin\left(\frac{a\_rhoz\,\pi\,z}{L}\right)\\
&-u\_0^2\,rho\_x\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)-u\_0^2\,rho\_y\cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)\\
&-u\_x^2\sin\left(\frac{a\_ux\,\pi\,x}{L}\right)^2rho\_0-u\_y^2\cos\left(\frac{a\_uy\,\pi\,y}{L}\right)^2rho\_0\\
&-u\_z^2\cos\left(\frac{a\_uz\,\pi\,z}{L}\right)^2rho\_0+u\_0^2\,\gamma\,rho\_0-3\,v\_0^2\,rho\_z\sin\left(\frac{a\_rhoz\,\pi\,z}{L}\right)\\
&-3\,v\_0^2\,rho\_x\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)-3\,v\_0^2\,rho\_y\cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)\\
&-w\_0^2\,rho\_z\sin\left(\frac{a\_rhoz\,\pi\,z}{L}\right)-w\_0^2\,rho\_x\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)\\
&-w\_0^2\,rho\_y\cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)+3\,\gamma\,v\_0^2\,rho\_0+\gamma\,w\_0^2\,rho\_0\\
&-3\,v\_z^2\sin\left(\frac{a\_vz\,\pi\,z}{L}\right)^2rho\_0-3\,v\_x^2\cos\left(\frac{a\_vx\,\pi\,x}{L}\right)^2rho\_0\\
&-3\,v\_y^2\sin\left(\frac{a\_vy\,\pi\,y}{L}\right)^2rho\_0-w\_z^2\cos\left(\frac{a\_wz\,\pi\,z}{L}\right)^2rho\_0\\
&-w\_x^2\sin\left(\frac{a\_wx\,\pi\,x}{L}\right)^2rho\_0-w\_y^2\sin\left(\frac{a\_wy\,\pi\,y}{L}\right)^2rho\_0\\
&-u\_x^2\sin\left(\frac{a\_ux\,\pi\,x}{L}\right)^2rho\_z\sin\left(\frac{a\_rhoz\,\pi\,z}{L}\right)\\
&-u\_x^2\sin\left(\frac{a\_ux\,\pi\,x}{L}\right)^2rho\_x\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)\\
&-u\_x^2\sin\left(\frac{a\_ux\,\pi\,x}{L}\right)^2rho\_y\cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)\\
&-u\_y^2\cos\left(\frac{a\_uy\,\pi\,y}{L}\right)^2rho\_z\sin\left(\frac{a\_rhoz\,\pi\,z}{L}\right)\\
&-u\_y^2\cos\left(\frac{a\_uy\,\pi\,y}{L}\right)^2rho\_x\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)\\
&-u\_y^2\cos\left(\frac{a\_uy\,\pi\,y}{L}\right)^2rho\_y\cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)\\
&-u\_z^2\cos\left(\frac{a\_uz\,\pi\,z}{L}\right)^2rho\_z\sin\left(\frac{a\_rhoz\,\pi\,z}{L}\right)\\
&-u\_z^2\cos\left(\frac{a\_uz\,\pi\,z}{L}\right)^2rho\_x\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)\\
&-u\_z^2\cos\left(\frac{a\_uz\,\pi\,z}{L}\right)^2rho\_y\cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)
\end{aligned}
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\begin{aligned}
&+ u\_0^2\,\gamma\,rho\_z\sin\left(\frac{a\_rhoz\,\pi\,z}{L}\right) + u\_0^2\,\gamma\,rho\_x\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)\\
&+ u\_0^2\,\gamma\,rho\_y\cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right) - 2\,u\_0\,u\_x\sin\left(\frac{a\_ux\,\pi\,x}{L}\right)\,rho\_0\\
&- 2\,u\_0\,u\_y\cos\left(\frac{a\_uy\,\pi\,y}{L}\right)\,rho\_0 - 2\,u\_0\,u\_z\cos\left(\frac{a\_uz\,\pi\,z}{L}\right)\,rho\_0\\
&+ u\_x^2\sin\left(\frac{a\_ux\,\pi\,x}{L}\right)^2\gamma\,rho\_0 + u\_y^2\cos\left(\frac{a\_uy\,\pi\,y}{L}\right)^2\gamma\,rho\_0\\
&+ u\_z^2\cos\left(\frac{a\_uz\,\pi\,z}{L}\right)^2\gamma\,rho\_0 + 3\,\gamma\,v\_z^2\sin\left(\frac{a\_vz\,\pi\,z}{L}\right)^2 rho\_0\\
&+ 3\,\gamma\,v\_x^2\cos\left(\frac{a\_vx\,\pi\,x}{L}\right)^2 rho\_0 + 3\,\gamma\,v\_y^2\sin\left(\frac{a\_vy\,\pi\,y}{L}\right)^2 rho\_0\\
&+ \gamma\,w\_z^2\cos\left(\frac{a\_wz\,\pi\,z}{L}\right)^2 rho\_0 + \gamma\,w\_x^2\sin\left(\frac{a\_wx\,\pi\,x}{L}\right)^2 rho\_0\\
&+ \gamma\,w\_y^2\sin\left(\frac{a\_wy\,\pi\,y}{L}\right)^2 rho\_0 - 6\,v\_z\sin\left(\frac{a\_vz\,\pi\,z}{L}\right)\,v\_0\,rho\_0\\
&- 6\,v\_0\,v\_x\cos\left(\frac{a\_vx\,\pi\,x}{L}\right)\,rho\_0 - 6\,v\_0\,v\_y\sin\left(\frac{a\_vy\,\pi\,y}{L}\right)\,rho\_0\\
&+ 3\,\gamma\,v\_0^2\,rho\_z\sin\left(\frac{a\_rhoz\,\pi\,z}{L}\right) + 3\,\gamma\,v\_0^2\,rho\_x\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)\\
&+ 3\,\gamma\,v\_0^2\,rho\_y\cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right) + \gamma\,w\_0^2\,rho\_z\sin\left(\frac{a\_rhoz\,\pi\,z}{L}\right)\\
&+ \gamma\,w\_0^2\,rho\_x\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right) + \gamma\,w\_0^2\,rho\_y\cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)\\
&- 2\,w\_z\cos\left(\frac{a\_wz\,\pi\,z}{L}\right)\,w\_0\,rho\_0 - 2\,w\_0\,w\_x\sin\left(\frac{a\_wx\,\pi\,x}{L}\right)\,rho\_0\\
&- 2\,w\_0\,w\_y\sin\left(\frac{a\_wy\,\pi\,y}{L}\right)\,rho\_0\\
&- 3\,v\_z^2\sin\left(\frac{a\_vz\,\pi\,z}{L}\right)^2 rho\_z\sin\left(\frac{a\_rhoz\,\pi\,z}{L}\right)\\
&- 3\,v\_z^2\sin\left(\frac{a\_vz\,\pi\,z}{L}\right)^2 rho\_x\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)\\
&- 3\,v\_z^2\sin\left(\frac{a\_vz\,\pi\,z}{L}\right)^2 rho\_y\cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)\\
&- 3\,v\_x^2\cos\left(\frac{a\_vx\,\pi\,x}{L}\right)^2 rho\_z\sin\left(\frac{a\_rhoz\,\pi\,z}{L}\right)\\
&- 3\,v\_x^2\cos\left(\frac{a\_vx\,\pi\,x}{L}\right)^2 rho\_x\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)\\
&- 3\,v\_x^2\cos\left(\frac{a\_vx\,\pi\,x}{L}\right)^2 rho\_y\cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)
\end{aligned}
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\begin{aligned}
&-3\,v\_y^2\sin\left(\frac{a\_vy\,\pi\,y}{L}\right)^2 rho\_z\sin\left(\frac{a\_rhoz\,\pi\,z}{L}\right)\\
&-3\,v\_y^2\sin\left(\frac{a\_vy\,\pi\,y}{L}\right)^2 rho\_x\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)\\
&-3\,v\_y^2\sin\left(\frac{a\_vy\,\pi\,y}{L}\right)^2 rho\_y\cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)\\
&-w\_z^2\cos\left(\frac{a\_wz\,\pi\,z}{L}\right)^2 rho\_z\sin\left(\frac{a\_rhoz\,\pi\,z}{L}\right)\\
&-w\_z^2\cos\left(\frac{a\_wz\,\pi\,z}{L}\right)^2 rho\_x\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)\\
&-w\_z^2\cos\left(\frac{a\_wz\,\pi\,z}{L}\right)^2 rho\_y\cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)\\
&-w\_x^2\sin\left(\frac{a\_wx\,\pi\,x}{L}\right)^2 rho\_z\sin\left(\frac{a\_rhoz\,\pi\,z}{L}\right)\\
&-w\_x^2\sin\left(\frac{a\_wx\,\pi\,x}{L}\right)^2 rho\_x\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)\\
&-w\_x^2\sin\left(\frac{a\_wx\,\pi\,x}{L}\right)^2 rho\_y\cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)\\
&-w\_y^2\sin\left(\frac{a\_wy\,\pi\,y}{L}\right)^2 rho\_z\sin\left(\frac{a\_rhoz\,\pi\,z}{L}\right)\\
&-w\_y^2\sin\left(\frac{a\_wy\,\pi\,y}{L}\right)^2 rho\_x\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)\\
&-w\_y^2\sin\left(\frac{a\_wy\,\pi\,y}{L}\right)^2 rho\_y\cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)\\
&+2\,u\_x\sin\left(\frac{a\_ux\,\pi\,x}{L}\right)u\_y\cos\left(\frac{a\_uy\,\pi\,y}{L}\right)\gamma\,rho\_z\sin\left(\frac{a\_rhoz\,\pi\,z}{L}\right)\\
&+2\,u\_x\sin\left(\frac{a\_ux\,\pi\,x}{L}\right)u\_y\cos\left(\frac{a\_uy\,\pi\,y}{L}\right)\gamma\,rho\_x\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)\\
&+2\,u\_x\sin\left(\frac{a\_ux\,\pi\,x}{L}\right)u\_y\cos\left(\frac{a\_uy\,\pi\,y}{L}\right)\gamma\,rho\_y\cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)\\
&+2\,u\_x\sin\left(\frac{a\_ux\,\pi\,x}{L}\right)u\_z\cos\left(\frac{a\_uz\,\pi\,z}{L}\right)\gamma\,rho\_z\sin\left(\frac{a\_rhoz\,\pi\,z}{L}\right)\\
&+2\,u\_x\sin\left(\frac{a\_ux\,\pi\,x}{L}\right)u\_z\cos\left(\frac{a\_uz\,\pi\,z}{L}\right)\gamma\,rho\_x\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)\\
&+2\,u\_x\sin\left(\frac{a\_ux\,\pi\,x}{L}\right)u\_z\cos\left(\frac{a\_uz\,\pi\,z}{L}\right)\gamma\,rho\_y\cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)\\
&+2\,u\_y\cos\left(\frac{a\_uy\,\pi\,y}{L}\right)u\_z\cos\left(\frac{a\_uz\,\pi\,z}{L}\right)\gamma\,rho\_z\sin\left(\frac{a\_rhoz\,\pi\,z}{L}\right)\\
&+2\,u\_y\cos\left(\frac{a\_uy\,\pi\,y}{L}\right)u\_z\cos\left(\frac{a\_uz\,\pi\,z}{L}\right)\gamma\,rho\_x\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)
\end{aligned}
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\begin{aligned}
&+2\,u\_y\cos\left(\frac{a\_uy\,\pi\,y}{L}\right)\,u\_z\cos\left(\frac{a\_uz\,\pi\,z}{L}\right)\,\gamma\,rho\_y\cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)\\
&+6\,\gamma\,v\_z\sin\left(\frac{a\_vz\,\pi\,z}{L}\right)\,v\_x\cos\left(\frac{a\_vx\,\pi\,x}{L}\right)\,rho\_z\sin\left(\frac{a\_rhoz\,\pi\,z}{L}\right)\\
&+6\,\gamma\,v\_z\sin\left(\frac{a\_vz\,\pi\,z}{L}\right)\,v\_x\cos\left(\frac{a\_vx\,\pi\,x}{L}\right)\,rho\_x\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)\\
&+6\,\gamma\,v\_z\sin\left(\frac{a\_vz\,\pi\,z}{L}\right)\,v\_x\cos\left(\frac{a\_vx\,\pi\,x}{L}\right)\,rho\_y\cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)\\
&+6\,\gamma\,v\_z\sin\left(\frac{a\_vz\,\pi\,z}{L}\right)\,v\_y\sin\left(\frac{a\_vy\,\pi\,y}{L}\right)\,rho\_z\sin\left(\frac{a\_rhoz\,\pi\,z}{L}\right)\\
&+6\,\gamma\,v\_z\sin\left(\frac{a\_vz\,\pi\,z}{L}\right)\,v\_y\sin\left(\frac{a\_vy\,\pi\,y}{L}\right)\,rho\_x\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)\\
&+6\,\gamma\,v\_z\sin\left(\frac{a\_vz\,\pi\,z}{L}\right)\,v\_y\sin\left(\frac{a\_vy\,\pi\,y}{L}\right)\,rho\_y\cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)\\
&+6\,\gamma\,v\_x\cos\left(\frac{a\_vx\,\pi\,x}{L}\right)\,v\_y\sin\left(\frac{a\_vy\,\pi\,y}{L}\right)\,rho\_z\sin\left(\frac{a\_rhoz\,\pi\,z}{L}\right)\\
&+6\,\gamma\,v\_x\cos\left(\frac{a\_vx\,\pi\,x}{L}\right)\,v\_y\sin\left(\frac{a\_vy\,\pi\,y}{L}\right)\,rho\_x\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)\\
&+6\,\gamma\,v\_x\cos\left(\frac{a\_vx\,\pi\,x}{L}\right)\,v\_y\sin\left(\frac{a\_vy\,\pi\,y}{L}\right)\,rho\_y\cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)\\
&+2\,\gamma\,w\_z\cos\left(\frac{a\_wz\,\pi\,z}{L}\right)\,w\_x\sin\left(\frac{a\_wx\,\pi\,x}{L}\right)\,rho\_z\sin\left(\frac{a\_rhoz\,\pi\,z}{L}\right)\\
&+2\,\gamma\,w\_z\cos\left(\frac{a\_wz\,\pi\,z}{L}\right)\,w\_x\sin\left(\frac{a\_wx\,\pi\,x}{L}\right)\,rho\_x\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)\\
&+2\,\gamma\,w\_z\cos\left(\frac{a\_wz\,\pi\,z}{L}\right)\,w\_x\sin\left(\frac{a\_wx\,\pi\,x}{L}\right)\,rho\_y\cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)\\
&+2\,\gamma\,w\_z\cos\left(\frac{a\_wz\,\pi\,z}{L}\right)\,w\_y\sin\left(\frac{a\_wy\,\pi\,y}{L}\right)\,rho\_z\sin\left(\frac{a\_rhoz\,\pi\,z}{L}\right)\\
&+2\,\gamma\,w\_z\cos\left(\frac{a\_wz\,\pi\,z}{L}\right)\,w\_y\sin\left(\frac{a\_wy\,\pi\,y}{L}\right)\,rho\_x\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)\\
&+2\,\gamma\,w\_z\cos\left(\frac{a\_wz\,\pi\,z}{L}\right)\,w\_y\sin\left(\frac{a\_wy\,\pi\,y}{L}\right)\,rho\_y\cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)\\
&+2\,\gamma\,w\_x\sin\left(\frac{a\_wx\,\pi\,x}{L}\right)\,w\_y\sin\left(\frac{a\_wy\,\pi\,y}{L}\right)\,rho\_z\sin\left(\frac{a\_rhoz\,\pi\,z}{L}\right)\\
&+2\,\gamma\,w\_x\sin\left(\frac{a\_wx\,\pi\,x}{L}\right)\,w\_y\sin\left(\frac{a\_wy\,\pi\,y}{L}\right)\,rho\_x\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)\\
&+2\,\gamma\,w\_x\sin\left(\frac{a\_wx\,\pi\,x}{L}\right)\,w\_y\sin\left(\frac{a\_wy\,\pi\,y}{L}\right)\,rho\_y\cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)\\
&-2\,u\_x\sin\left(\frac{a\_ux\,\pi\,x}{L}\right)\,u\_y\cos\left(\frac{a\_uy\,\pi\,y}{L}\right)\,rho\_z\sin\left(\frac{a\_rhoz\,\pi\,z}{L}\right)
\end{aligned}
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\begin{aligned}
&-2\,u\_x\sin\left(\frac{a\_ux\pi\,x}{L}\right)u\_y\cos\left(\frac{a\_uy\pi\,y}{L}\right)rho\_x\sin\left(\frac{a\_rhox\pi\,x}{L}\right)\\
&-2\,u\_x\sin\left(\frac{a\_ux\pi\,x}{L}\right)u\_y\cos\left(\frac{a\_uy\pi\,y}{L}\right)rho\_y\cos\left(\frac{a\_rhoy\pi\,y}{L}\right)\\
&-2\,u\_x\sin\left(\frac{a\_ux\pi\,x}{L}\right)u\_z\cos\left(\frac{a\_uz\pi\,z}{L}\right)rho\_z\sin\left(\frac{a\_rhoz\pi\,z}{L}\right)\\
&-2\,u\_x\sin\left(\frac{a\_ux\pi\,x}{L}\right)u\_z\cos\left(\frac{a\_uz\pi\,z}{L}\right)rho\_x\sin\left(\frac{a\_rhox\pi\,x}{L}\right)\\
&-2\,u\_x\sin\left(\frac{a\_ux\pi\,x}{L}\right)u\_z\cos\left(\frac{a\_uz\pi\,z}{L}\right)rho\_y\cos\left(\frac{a\_rhoy\pi\,y}{L}\right)\\
&-2\,u\_y\cos\left(\frac{a\_uy\pi\,y}{L}\right)u\_z\cos\left(\frac{a\_uz\pi\,z}{L}\right)rho\_z\sin\left(\frac{a\_rhoz\pi\,z}{L}\right)\\
&-2\,u\_y\cos\left(\frac{a\_uy\pi\,y}{L}\right)u\_z\cos\left(\frac{a\_uz\pi\,z}{L}\right)rho\_x\sin\left(\frac{a\_rhox\pi\,x}{L}\right)\\
&-2\,u\_y\cos\left(\frac{a\_uy\pi\,y}{L}\right)u\_z\cos\left(\frac{a\_uz\pi\,z}{L}\right)rho\_y\cos\left(\frac{a\_rhoy\pi\,y}{L}\right)\\
&+2\,u\_0\,u\_x\sin\left(\frac{a\_ux\pi\,x}{L}\right)\gamma\,rho\_z\sin\left(\frac{a\_rhoz\pi\,z}{L}\right)\\
&+2\,u\_0\,u\_x\sin\left(\frac{a\_ux\pi\,x}{L}\right)\gamma\,rho\_x\sin\left(\frac{a\_rhox\pi\,x}{L}\right)\\
&+2\,u\_0\,u\_x\sin\left(\frac{a\_ux\pi\,x}{L}\right)\gamma\,rho\_y\cos\left(\frac{a\_rhoy\pi\,y}{L}\right)\\
&+2\,u\_0\,u\_z\cos\left(\frac{a\_uz\pi\,z}{L}\right)\gamma\,rho\_z\sin\left(\frac{a\_rhoz\pi\,z}{L}\right)\\
&+2\,u\_0\,u\_z\cos\left(\frac{a\_uz\pi\,z}{L}\right)\gamma\,rho\_x\sin\left(\frac{a\_rhox\pi\,x}{L}\right)\\
&+2\,u\_0\,u\_z\cos\left(\frac{a\_uz\pi\,z}{L}\right)\gamma\,rho\_y\cos\left(\frac{a\_rhoy\pi\,y}{L}\right)\\
&+2\,u\_0\,u\_y\cos\left(\frac{a\_uy\pi\,y}{L}\right)\gamma\,rho\_z\sin\left(\frac{a\_rhoz\pi\,z}{L}\right)\\
&+2\,u\_0\,u\_y\cos\left(\frac{a\_uy\pi\,y}{L}\right)\gamma\,rho\_x\sin\left(\frac{a\_rhox\pi\,x}{L}\right)\\
&+2\,u\_0\,u\_y\cos\left(\frac{a\_uy\pi\,y}{L}\right)\gamma\,rho\_y\cos\left(\frac{a\_rhoy\pi\,y}{L}\right)\\
&+2\,u\_x\sin\left(\frac{a\_ux\pi\,x}{L}\right)u\_y\cos\left(\frac{a\_uy\pi\,y}{L}\right)\gamma\,rho\_0\\
&+2\,u\_x\sin\left(\frac{a\_ux\pi\,x}{L}\right)u\_z\cos\left(\frac{a\_uz\pi\,z}{L}\right)\gamma\,rho\_0\\
&+2\,u\_y\cos\left(\frac{a\_uy\pi\,y}{L}\right)u\_z\cos\left(\frac{a\_uz\pi\,z}{L}\right)\gamma\,rho\_0
\end{aligned}
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\begin{aligned}
&+6\,\gamma\,v\_z\,\sin\left(\frac{a\_vz\,\pi\,z}{L}\right)\,v\_0\,rho\_z\,\sin\left(\frac{a\_rhoz\,\pi\,z}{L}\right)\\
&+6\,\gamma\,v\_z\,\sin\left(\frac{a\_vz\,\pi\,z}{L}\right)\,v\_0\,rho\_x\,\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)\\
&+6\,\gamma\,v\_z\,\sin\left(\frac{a\_vz\,\pi\,z}{L}\right)\,v\_0\,rho\_y\,\cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)\\
&+6\,\gamma\,v\_0\,v\_x\,\cos\left(\frac{a\_vx\,\pi\,x}{L}\right)\,rho\_z\,\sin\left(\frac{a\_rhoz\,\pi\,z}{L}\right)\\
&+6\,\gamma\,v\_0\,v\_x\,\cos\left(\frac{a\_vx\,\pi\,x}{L}\right)\,rho\_x\,\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)\\
&+6\,\gamma\,v\_0\,v\_x\,\cos\left(\frac{a\_vx\,\pi\,x}{L}\right)\,rho\_y\,\cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)\\
&+6\,\gamma\,v\_0\,v\_y\,\sin\left(\frac{a\_vy\,\pi\,y}{L}\right)\,rho\_z\,\sin\left(\frac{a\_rhoz\,\pi\,z}{L}\right)\\
&+6\,\gamma\,v\_0\,v\_y\,\sin\left(\frac{a\_vy\,\pi\,y}{L}\right)\,rho\_x\,\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)\\
&+6\,\gamma\,v\_0\,v\_y\,\sin\left(\frac{a\_vy\,\pi\,y}{L}\right)\,rho\_y\,\cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)\\
&-6\,v\_z\,\sin\left(\frac{a\_vz\,\pi\,z}{L}\right)\,v\_x\,\cos\left(\frac{a\_vx\,\pi\,x}{L}\right)\,rho\_z\,\sin\left(\frac{a\_rhoz\,\pi\,z}{L}\right)\\
&-6\,v\_z\,\sin\left(\frac{a\_vz\,\pi\,z}{L}\right)\,v\_x\,\cos\left(\frac{a\_vx\,\pi\,x}{L}\right)\,rho\_x\,\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)\\
&-6\,v\_z\,\sin\left(\frac{a\_vz\,\pi\,z}{L}\right)\,v\_x\,\cos\left(\frac{a\_vx\,\pi\,x}{L}\right)\,rho\_y\,\cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)\\
&-6\,v\_z\,\sin\left(\frac{a\_vz\,\pi\,z}{L}\right)\,v\_y\,\sin\left(\frac{a\_vy\,\pi\,y}{L}\right)\,rho\_z\,\sin\left(\frac{a\_rhoz\,\pi\,z}{L}\right)\\
&-6\,v\_z\,\sin\left(\frac{a\_vz\,\pi\,z}{L}\right)\,v\_y\,\sin\left(\frac{a\_vy\,\pi\,y}{L}\right)\,rho\_x\,\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)\\
&-6\,v\_z\,\sin\left(\frac{a\_vz\,\pi\,z}{L}\right)\,v\_y\,\sin\left(\frac{a\_vy\,\pi\,y}{L}\right)\,rho\_y\,\cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)\\
&-6\,v\_x\,\cos\left(\frac{a\_vx\,\pi\,x}{L}\right)\,v\_y\,\sin\left(\frac{a\_vy\,\pi\,y}{L}\right)\,rho\_z\,\sin\left(\frac{a\_rhoz\,\pi\,z}{L}\right)\\
&-6\,v\_x\,\cos\left(\frac{a\_vx\,\pi\,x}{L}\right)\,v\_y\,\sin\left(\frac{a\_vy\,\pi\,y}{L}\right)\,rho\_x\,\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)\\
&-6\,v\_x\,\cos\left(\frac{a\_vx\,\pi\,x}{L}\right)\,v\_y\,\sin\left(\frac{a\_vy\,\pi\,y}{L}\right)\,rho\_y\,\cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)\\
&-2\,w\_z\,\cos\left(\frac{a\_wz\,\pi\,z}{L}\right)\,w\_x\,\sin\left(\frac{a\_wx\,\pi\,x}{L}\right)\,rho\_z\,\sin\left(\frac{a\_rhoz\,\pi\,z}{L}\right)\\
&-2\,w\_z\,\cos\left(\frac{a\_wz\,\pi\,z}{L}\right)\,w\_x\,\sin\left(\frac{a\_wx\,\pi\,x}{L}\right)\,rho\_x\,\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)
\end{aligned}
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\begin{aligned}
&-2\, w\_z \cos\left(\frac{a\_wz\,\pi\, z}{L}\right) w\_x \sin\left(\frac{a\_wx\,\pi\, x}{L}\right) rho\_y \cos\left(\frac{a\_rhoy\,\pi\, y}{L}\right)\\
&-2\, w\_z \cos\left(\frac{a\_wz\,\pi\, z}{L}\right) w\_y \sin\left(\frac{a\_wy\,\pi\, y}{L}\right) rho\_z \sin\left(\frac{a\_rhoz\,\pi\, z}{L}\right)\\
&-2\, w\_z \cos\left(\frac{a\_wz\,\pi\, z}{L}\right) w\_y \sin\left(\frac{a\_wy\,\pi\, y}{L}\right) rho\_x \sin\left(\frac{a\_rhox\,\pi\, x}{L}\right)\\
&-2\, w\_z \cos\left(\frac{a\_wz\,\pi\, z}{L}\right) w\_y \sin\left(\frac{a\_wy\,\pi\, y}{L}\right) rho\_y \cos\left(\frac{a\_rhoy\,\pi\, y}{L}\right)\\
&-2\, w\_x \sin\left(\frac{a\_wx\,\pi\, x}{L}\right) w\_y \sin\left(\frac{a\_wy\,\pi\, y}{L}\right) rho\_z \sin\left(\frac{a\_rhoz\,\pi\, z}{L}\right)\\
&-2\, w\_x \sin\left(\frac{a\_wx\,\pi\, x}{L}\right) w\_y \sin\left(\frac{a\_wy\,\pi\, y}{L}\right) rho\_x \sin\left(\frac{a\_rhox\,\pi\, x}{L}\right)\\
&-2\, w\_x \sin\left(\frac{a\_wx\,\pi\, x}{L}\right) w\_y \sin\left(\frac{a\_wy\,\pi\, y}{L}\right) rho\_y \cos\left(\frac{a\_rhoy\,\pi\, y}{L}\right)\\
&+2\,\gamma\, w\_z \cos\left(\frac{a\_wz\,\pi\, z}{L}\right) w\_0\, rho\_z \sin\left(\frac{a\_rhoz\,\pi\, z}{L}\right)\\
&+2\,\gamma\, w\_z \cos\left(\frac{a\_wz\,\pi\, z}{L}\right) w\_0\, rho\_x \sin\left(\frac{a\_rhox\,\pi\, x}{L}\right)\\
&+2\,\gamma\, w\_z \cos\left(\frac{a\_wz\,\pi\, z}{L}\right) w\_0\, rho\_y \cos\left(\frac{a\_rhoy\,\pi\, y}{L}\right)\\
&+2\,\gamma\, w\_0\, w\_x \sin\left(\frac{a\_wx\,\pi\, x}{L}\right) rho\_z \sin\left(\frac{a\_rhoz\,\pi\, z}{L}\right)\\
&+2\,\gamma\, w\_0\, w\_x \sin\left(\frac{a\_wx\,\pi\, x}{L}\right) rho\_x \sin\left(\frac{a\_rhox\,\pi\, x}{L}\right)\\
&+2\,\gamma\, w\_0\, w\_x \sin\left(\frac{a\_wx\,\pi\, x}{L}\right) rho\_y \cos\left(\frac{a\_rhoy\,\pi\, y}{L}\right)\\
&+2\,\gamma\, w\_0\, w\_y \sin\left(\frac{a\_wy\,\pi\, y}{L}\right) rho\_z \sin\left(\frac{a\_rhoz\,\pi\, z}{L}\right)\\
&+2\,\gamma\, w\_0\, w\_y \sin\left(\frac{a\_wy\,\pi\, y}{L}\right) rho\_x \sin\left(\frac{a\_rhox\,\pi\, x}{L}\right)\\
&+2\,\gamma\, w\_0\, w\_y \sin\left(\frac{a\_wy\,\pi\, y}{L}\right) rho\_y \cos\left(\frac{a\_rhoy\,\pi\, y}{L}\right)\\
&+6\,\gamma\, v\_z \sin\left(\frac{a\_vz\,\pi\, z}{L}\right) v\_x \cos\left(\frac{a\_vx\,\pi\, x}{L}\right) rho\_0\\
&+6\,\gamma\, v\_z \sin\left(\frac{a\_vz\,\pi\, z}{L}\right) v\_y \sin\left(\frac{a\_vy\,\pi\, y}{L}\right) rho\_0\\
&+6\,\gamma\, v\_x \cos\left(\frac{a\_vx\,\pi\, x}{L}\right) v\_y \sin\left(\frac{a\_vy\,\pi\, y}{L}\right) rho\_0\\
&+2\,\gamma\, w\_z \cos\left(\frac{a\_wz\,\pi\, z}{L}\right) w\_x \sin\left(\frac{a\_wx\,\pi\, x}{L}\right) rho\_0
\end{aligned}
$$

$$
\begin{aligned}
&+2\,\gamma\,w\_z\cos\left(\frac{a\_wz\,\pi\,z}{L}\right)w\_y\sin\left(\frac{a\_wy\,\pi\,y}{L}\right)rho\_0\\
&+2\,\gamma\,w\_x\sin\left(\frac{a\_wx\,\pi\,x}{L}\right)w\_y\sin\left(\frac{a\_wy\,\pi\,y}{L}\right)rho\_0\\
&-2\,u\_x\sin\left(\frac{a\_ux\,\pi\,x}{L}\right)u\_y\cos\left(\frac{a\_uy\,\pi\,y}{L}\right)rho\_0\\
&-2\,u\_x\sin\left(\frac{a\_ux\,\pi\,x}{L}\right)u\_z\cos\left(\frac{a\_uz\,\pi\,z}{L}\right)rho\_0\\
&-2\,u\_y\cos\left(\frac{a\_uy\,\pi\,y}{L}\right)u\_z\cos\left(\frac{a\_uz\,\pi\,z}{L}\right)rho\_0\\
&+2\,u\_0\,u\_x\sin\left(\frac{a\_ux\,\pi\,x}{L}\right)\gamma\,rho\_0+2\,u\_0\,u\_z\cos\left(\frac{a\_uz\,\pi\,z}{L}\right)\gamma\,rho\_0\\
&+2\,u\_0\,u\_y\cos\left(\frac{a\_uy\,\pi\,y}{L}\right)\gamma\,rho\_0\\
&-2\,u\_0\,u\_x\sin\left(\frac{a\_ux\,\pi\,x}{L}\right)rho\_z\sin\left(\frac{a\_rhoz\,\pi\,z}{L}\right)\\
&-2\,u\_0\,u\_x\sin\left(\frac{a\_ux\,\pi\,x}{L}\right)rho\_x\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)\\
&-2\,u\_0\,u\_x\sin\left(\frac{a\_ux\,\pi\,x}{L}\right)rho\_y\cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)\\
&-2\,u\_0\,u\_y\cos\left(\frac{a\_uy\,\pi\,y}{L}\right)rho\_z\sin\left(\frac{a\_rhoz\,\pi\,z}{L}\right)\\
&-2\,u\_0\,u\_y\cos\left(\frac{a\_uy\,\pi\,y}{L}\right)rho\_x\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)\\
&-2\,u\_0\,u\_y\cos\left(\frac{a\_uy\,\pi\,y}{L}\right)rho\_y\cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)\\
&-2\,u\_0\,u\_z\cos\left(\frac{a\_uz\,\pi\,z}{L}\right)rho\_z\sin\left(\frac{a\_rhoz\,\pi\,z}{L}\right)\\
&-2\,u\_0\,u\_z\cos\left(\frac{a\_uz\,\pi\,z}{L}\right)rho\_x\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)\\
&-2\,u\_0\,u\_z\cos\left(\frac{a\_uz\,\pi\,z}{L}\right)rho\_y\cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)\\
&+u\_x^2\sin\left(\frac{a\_ux\,\pi\,x}{L}\right)^2\gamma\,rho\_z\sin\left(\frac{a\_rhoz\,\pi\,z}{L}\right)\\
&+u\_x^2\sin\left(\frac{a\_ux\,\pi\,x}{L}\right)^2\gamma\,rho\_x\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)\\
&+u\_x^2\sin\left(\frac{a\_ux\,\pi\,x}{L}\right)^2\gamma\,rho\_y\cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)\\
&+u\_y^2\cos\left(\frac{a\_uy\,\pi\,y}{L}\right)^2\gamma\,rho\_z\sin\left(\frac{a\_rhoz\,\pi\,z}{L}\right)
\end{aligned}
$$

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\begin{aligned}
&+ u\_y^2 \cos\left(\frac{a\_uy\,\pi\,y}{L}\right)^2 \gamma\, rho\_x \sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)\\
&+ u\_y^2 \cos\left(\frac{a\_uy\,\pi\,y}{L}\right)^2 \gamma\, rho\_y \cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)\\
&+ u\_z^2 \cos\left(\frac{a\_uz\,\pi\,z}{L}\right)^2 \gamma\, rho\_z \sin\left(\frac{a\_rhoz\,\pi\,z}{L}\right)\\
&+ u\_z^2 \cos\left(\frac{a\_uz\,\pi\,z}{L}\right)^2 \gamma\, rho\_x \sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)\\
&+ u\_z^2 \cos\left(\frac{a\_uz\,\pi\,z}{L}\right)^2 \gamma\, rho\_y \cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)\\
&+ 6\,\gamma\, v\_z \sin\left(\frac{a\_vz\,\pi\,z}{L}\right) v\_0\, rho\_0 + 6\,\gamma\, v\_0\, v\_x \cos\left(\frac{a\_vx\,\pi\,x}{L}\right) rho\_0\\
&+ 6\,\gamma\, v\_0\, v\_y \sin\left(\frac{a\_vy\,\pi\,y}{L}\right) rho\_0\\
&- 6\, v\_z \sin\left(\frac{a\_vz\,\pi\,z}{L}\right) v\_x \cos\left(\frac{a\_vx\,\pi\,x}{L}\right) rho\_0\\
&- 6\, v\_z \sin\left(\frac{a\_vz\,\pi\,z}{L}\right) v\_y \sin\left(\frac{a\_vy\,\pi\,y}{L}\right) rho\_0\\
&- 6\, v\_x \cos\left(\frac{a\_vx\,\pi\,x}{L}\right) v\_y \sin\left(\frac{a\_vy\,\pi\,y}{L}\right) rho\_0\\
&+ 3\,\gamma\, v\_z^2 \sin\left(\frac{a\_vz\,\pi\,z}{L}\right)^2 rho\_z \sin\left(\frac{a\_rhoz\,\pi\,z}{L}\right)\\
&+ 3\,\gamma\, v\_z^2 \sin\left(\frac{a\_vz\,\pi\,z}{L}\right)^2 rho\_x \sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)\\
&+ 3\,\gamma\, v\_z^2 \sin\left(\frac{a\_vz\,\pi\,z}{L}\right)^2 rho\_y \cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)\\
&+ 3\,\gamma\, v\_x^2 \cos\left(\frac{a\_vx\,\pi\,x}{L}\right)^2 rho\_z \sin\left(\frac{a\_rhoz\,\pi\,z}{L}\right)\\
&+ 3\,\gamma\, v\_x^2 \cos\left(\frac{a\_vx\,\pi\,x}{L}\right)^2 rho\_x \sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)\\
&+ 3\,\gamma\, v\_x^2 \cos\left(\frac{a\_vx\,\pi\,x}{L}\right)^2 rho\_y \cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)\\
&+ 3\,\gamma\, v\_y^2 \sin\left(\frac{a\_vy\,\pi\,y}{L}\right)^2 rho\_z \sin\left(\frac{a\_rhoz\,\pi\,z}{L}\right)\\
&+ 3\,\gamma\, v\_y^2 \sin\left(\frac{a\_vy\,\pi\,y}{L}\right)^2 rho\_x \sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)\\
&+ 3\,\gamma\, v\_y^2 \sin\left(\frac{a\_vy\,\pi\,y}{L}\right)^2 rho\_y \cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)\\
&- 2\, w\_z \cos\left(\frac{a\_wz\,\pi\,z}{L}\right) w\_x \sin\left(\frac{a\_wx\,\pi\,x}{L}\right) rho\_0
\end{aligned}
$$

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\begin{aligned}
&-2\, w\_z \cos\left(\frac{a\_wz\,\pi\, z}{L}\right) w\_y \sin\left(\frac{a\_wy\,\pi\, y}{L}\right) rho\_0 \\
&-2\, w\_x \sin\left(\frac{a\_wx\,\pi\, x}{L}\right) w\_y \sin\left(\frac{a\_wy\,\pi\, y}{L}\right) rho\_0 \\
&+2\,\gamma\, w\_z \cos\left(\frac{a\_wz\,\pi\, z}{L}\right) w\_0\, rho\_0 + 2\,\gamma\, w\_0\, w\_x \sin\left(\frac{a\_wx\,\pi\, x}{L}\right) rho\_0 \\
&+2\,\gamma\, w\_0\, w\_y \sin\left(\frac{a\_wy\,\pi\, y}{L}\right) rho\_0 \\
&+\gamma\, w\_z^2 \cos\left(\frac{a\_wz\,\pi\, z}{L}\right)^2 rho\_z \sin\left(\frac{a\_rhoz\,\pi\, z}{L}\right) \\
&+\gamma\, w\_z^2 \cos\left(\frac{a\_wz\,\pi\, z}{L}\right)^2 rho\_x \sin\left(\frac{a\_rhox\,\pi\, x}{L}\right) \\
&+\gamma\, w\_z^2 \cos\left(\frac{a\_wz\,\pi\, z}{L}\right)^2 rho\_y \cos\left(\frac{a\_rhoy\,\pi\, y}{L}\right) \\
&+\gamma\, w\_x^2 \sin\left(\frac{a\_wx\,\pi\, x}{L}\right)^2 rho\_z \sin\left(\frac{a\_rhoz\,\pi\, z}{L}\right) \\
&+\gamma\, w\_x^2 \sin\left(\frac{a\_wx\,\pi\, x}{L}\right)^2 rho\_x \sin\left(\frac{a\_rhox\,\pi\, x}{L}\right) \\
&+\gamma\, w\_x^2 \sin\left(\frac{a\_wx\,\pi\, x}{L}\right)^2 rho\_y \cos\left(\frac{a\_rhoy\,\pi\, y}{L}\right) \\
&+\gamma\, w\_y^2 \sin\left(\frac{a\_wy\,\pi\, y}{L}\right)^2 rho\_z \sin\left(\frac{a\_rhoz\,\pi\, z}{L}\right) \\
&+\gamma\, w\_y^2 \sin\left(\frac{a\_wy\,\pi\, y}{L}\right)^2 rho\_x \sin\left(\frac{a\_rhox\,\pi\, x}{L}\right) \\
&+\gamma\, w\_y^2 \sin\left(\frac{a\_wy\,\pi\, y}{L}\right)^2 rho\_y \cos\left(\frac{a\_rhoy\,\pi\, y}{L}\right) \\
&-6\, \nu\_z \sin\left(\frac{a\_\nu z\,\pi\, z}{L}\right) \nu\_0\, rho\_z \sin\left(\frac{a\_rhoz\,\pi\, z}{L}\right) \\
&-6\, \nu\_z \sin\left(\frac{a\_\nu z\,\pi\, z}{L}\right) \nu\_0\, rho\_x \sin\left(\frac{a\_rhox\,\pi\, x}{L}\right) \\
&-6\, \nu\_z \sin\left(\frac{a\_\nu z\,\pi\, z}{L}\right) \nu\_0\, rho\_y \cos\left(\frac{a\_rhoy\,\pi\, y}{L}\right) \\
&-6\, \nu\_0\, \nu\_x \cos\left(\frac{a\_\nu x\,\pi\, x}{L}\right) rho\_z \sin\left(\frac{a\_rhoz\,\pi\, z}{L}\right) \\
&-6\, \nu\_0\, \nu\_x \cos\left(\frac{a\_\nu x\,\pi\, x}{L}\right) rho\_x \sin\left(\frac{a\_rhox\,\pi\, x}{L}\right) \\
&-6\, \nu\_0\, \nu\_x \cos\left(\frac{a\_\nu x\,\pi\, x}{L}\right) rho\_y \cos\left(\frac{a\_rhoy\,\pi\, y}{L}\right) \\
&-6\, \nu\_0\, \nu\_y \sin\left(\frac{a\_\nu y\,\pi\, y}{L}\right) rho\_z \sin\left(\frac{a\_rhoz\,\pi\, z}{L}\right)
\end{aligned}
$$

$$
\begin{aligned}
&-6\ v\_0\, v\_y \sin\left(\frac{a\_vy\,\pi\,y}{L}\right) rho\_x \sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)\\
&-6\ v\_0\, v\_y \sin\left(\frac{a\_vy\,\pi\,y}{L}\right) rho\_y \cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)\\
&-2\ w\_z \cos\left(\frac{a\_wz\,\pi\,z}{L}\right) w\_0\, rho\_z \sin\left(\frac{a\_rhoz\,\pi\,z}{L}\right)\\
&-2\ w\_z \cos\left(\frac{a\_wz\,\pi\,z}{L}\right) w\_0\, rho\_x \sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)\\
&-2\ w\_z \cos\left(\frac{a\_wz\,\pi\,z}{L}\right) w\_0\, rho\_y \cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)\\
&-2\ w\_0\, w\_x \sin\left(\frac{a\_wx\,\pi\,x}{L}\right) rho\_z \sin\left(\frac{a\_rhoz\,\pi\,z}{L}\right)\\
&-2\ w\_0\, w\_x \sin\left(\frac{a\_wx\,\pi\,x}{L}\right) rho\_x \sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)\\
&-2\ w\_0\, w\_x \sin\left(\frac{a\_wx\,\pi\,x}{L}\right) rho\_y \cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)\\
&-2\ w\_0\, w\_y \sin\left(\frac{a\_wy\,\pi\,y}{L}\right) rho\_z \sin\left(\frac{a\_rhoz\,\pi\,z}{L}\right)\\
&-2\ w\_0\, w\_y \sin\left(\frac{a\_wy\,\pi\,y}{L}\right) rho\_x \sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)\\
&-2\ w\_0\, w\_y \sin\left(\frac{a\_wy\,\pi\,y}{L}\right) rho\_y \cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)\Bigg)\\
&v\_y \cos\left(\frac{a\_vy\,\pi\,y}{L}\right) a\_vy\,\pi\Bigg) - \Bigg(\left(w\_0 + w\_x \sin\left(\frac{a\_wx\,\pi\,x}{L}\right)\right.\\
&\left. + w\_y \sin\left(\frac{a\_wy\,\pi\,y}{L}\right) + w\_z \cos\left(\frac{a\_wz\,\pi\,z}{L}\right)\right)\\
&\left(\cos\left(\frac{a\_vz\,\pi\,z}{L}\right) v\_z \left(rho\_0 + rho\_x \sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)\right.\right.\\
&\left.\left. + rho\_y \cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right) + rho\_z \sin\left(\frac{a\_rhoz\,\pi\,z}{L}\right)\right)^2 \left(v\_0\right.\right.\\
&\left.\left. + v\_x \cos\left(\frac{a\_vx\,\pi\,x}{L}\right) + v\_y \sin\left(\frac{a\_vy\,\pi\,y}{L}\right) + v\_z \sin\left(\frac{a\_vz\,\pi\,z}{L}\right)\right)\right.\\
&\left. - \cos\left(\frac{a\_vz\,\pi\,z}{L}\right) v\_z \left(rho\_0 + rho\_x \sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)\right.\right.\\
&\left.\left. + rho\_y \cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right) + rho\_z \sin\left(\frac{a\_rhoz\,\pi\,z}{L}\right)\right)^2 \left(v\_0\right.\right.\\
&\left.\left. + v\_x \cos\left(\frac{a\_vx\,\pi\,x}{L}\right) + v\_y \sin\left(\frac{a\_vy\,\pi\,y}{L}\right) + v\_z \sin\left(\frac{a\_vz\,\pi\,z}{L}\right)\right)\right) \gamma\Bigg) a\_vz\,\pi\Bigg)\\
&\Bigg/ \left((\gamma - 1)\ L \left(rho\_0 + rho\_x \sin\left(\frac{a\_rhox\,\pi\,x}{L}\right) + rho\_y \cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)\right.\right.
\end{aligned}
$$

$$+ rho\_z \sin\left(\frac{a\_rhoz\,\pi\,z}{L}\right)\Big)\Big) - \Big(\Big(u\_0 + u\_x \sin\left(\frac{a\_ux\,\pi\,x}{L}\right)$$
$$+ u\_y \cos\left(\frac{a\_uy\,\pi\,y}{L}\right) + u\_z \cos\left(\frac{a\_uz\,\pi\,z}{L}\right)\Big)$$
$$\Big(\cos\left(\frac{a\_wx\,\pi\,x}{L}\right) w\_x \Big(rho\_0 + rho\_x \sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)$$
$$+ rho\_y \cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right) + rho\_z \sin\left(\frac{a\_rhoz\,\pi\,z}{L}\right)\Big)^2 \Big(w\_0$$
$$+ w\_x \sin\left(\frac{a\_wx\,\pi\,x}{L}\right) + w\_y \sin\left(\frac{a\_wy\,\pi\,y}{L}\right) + w\_z \cos\left(\frac{a\_wz\,\pi\,z}{L}\right)\Big)$$
$$- \cos\left(\frac{a\_wx\,\pi\,x}{L}\right) w\_x \Big(rho\_0 + rho\_x \sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)$$
$$+ rho\_y \cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right) + rho\_z \sin\left(\frac{a\_rhoz\,\pi\,z}{L}\right)\Big)^2 \Big(w\_0$$
$$+ w\_x \sin\left(\frac{a\_wx\,\pi\,x}{L}\right) + w\_y \sin\left(\frac{a\_wy\,\pi\,y}{L}\right) + w\_z \cos\left(\frac{a\_wz\,\pi\,z}{L}\right)\Big)\,\gamma\Big)$$
$$a\_wx\,\pi\Big) \Big/ \Big((\gamma - 1)\, L \Big(rho\_0 + rho\_x \sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)$$
$$+ rho\_y \cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right) + rho\_z \sin\left(\frac{a\_rhoz\,\pi\,z}{L}\right)\Big)\Big) - \Big(\Big(v\_0$$
$$+ v\_x \cos\left(\frac{a\_vx\,\pi\,x}{L}\right) + v\_y \sin\left(\frac{a\_vy\,\pi\,y}{L}\right) + v\_z \sin\left(\frac{a\_vz\,\pi\,z}{L}\right)\Big)$$
$$\Big(\cos\left(\frac{a\_wy\,\pi\,y}{L}\right) w\_y \Big(rho\_0 + rho\_x \sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)$$
$$+ rho\_y \cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right) + rho\_z \sin\left(\frac{a\_rhoz\,\pi\,z}{L}\right)\Big)^2 \Big(w\_0$$
$$+ w\_x \sin\left(\frac{a\_wx\,\pi\,x}{L}\right) + w\_y \sin\left(\frac{a\_wy\,\pi\,y}{L}\right) + w\_z \cos\left(\frac{a\_wz\,\pi\,z}{L}\right)\Big)$$
$$- \cos\left(\frac{a\_wy\,\pi\,y}{L}\right) w\_y \Big(rho\_0 + rho\_x \sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)$$
$$+ rho\_y \cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right) + rho\_z \sin\left(\frac{a\_rhoz\,\pi\,z}{L}\right)\Big)^2 \Big(w\_0$$
$$+ w\_x \sin\left(\frac{a\_wx\,\pi\,x}{L}\right) + w\_y \sin\left(\frac{a\_wy\,\pi\,y}{L}\right) + w\_z \cos\left(\frac{a\_wz\,\pi\,z}{L}\right)\Big)\,\gamma\Big)$$
$$a\_wy\,\pi\Big) \Big/ \Big((\gamma - 1)\, L \Big(rho\_0 + rho\_x \sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)$$
$$+ rho\_y \cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right) + rho\_z \sin\left(\frac{a\_rhoz\,\pi\,z}{L}\right)\Big)\Big)$$
$$- \frac{1}{2}\, \frac{1}{L\,(\gamma - 1)} \Big(\Big(2\, p\_x \cos\left(\frac{a\_px\,\pi\,x}{L}\right)\gamma + 2\, p\_y \sin\left(\frac{a\_py\,\pi\,y}{L}\right)\gamma$$

$$
\begin{aligned}
&+2\,p\_z\cos\left(\frac{a\_pz\,\pi\,z}{L}\right)\gamma+2\,p\_0\,\gamma-u\_0^2\,rho\_0-v\_0^2\,rho\_0-3\,w\_0^2\,rho\_0\\
&-u\_0^2\,rho\_z\sin\left(\frac{a\_rhoz\,\pi\,z}{L}\right)-u\_0^2\,rho\_x\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)\\
&-u\_0^2\,rho\_y\cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)-u\_x^2\sin\left(\frac{a\_ux\,\pi\,x}{L}\right)^2 rho\_0\\
&-u\_y^2\cos\left(\frac{a\_uy\,\pi\,y}{L}\right)^2 rho\_0-u\_z^2\cos\left(\frac{a\_uz\,\pi\,z}{L}\right)^2 rho\_0+u\_0^2\,\gamma\,rho\_0\\
&-v\_0^2\,rho\_z\sin\left(\frac{a\_rhoz\,\pi\,z}{L}\right)-v\_0^2\,rho\_x\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)\\
&-v\_0^2\,rho\_y\cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)-3\,w\_0^2\,rho\_z\sin\left(\frac{a\_rhoz\,\pi\,z}{L}\right)\\
&-3\,w\_0^2\,rho\_x\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)-3\,w\_0^2\,rho\_y\cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)\\
&+\gamma\,v\_0^2\,rho\_0+3\,\gamma\,w\_0^2\,rho\_0-v\_z^2\sin\left(\frac{a\_vz\,\pi\,z}{L}\right)^2 rho\_0\\
&-v\_x^2\cos\left(\frac{a\_vx\,\pi\,x}{L}\right)^2 rho\_0-v\_y^2\sin\left(\frac{a\_vy\,\pi\,y}{L}\right)^2 rho\_0\\
&-3\,w\_z^2\cos\left(\frac{a\_wz\,\pi\,z}{L}\right)^2 rho\_0-3\,w\_x^2\sin\left(\frac{a\_wx\,\pi\,x}{L}\right)^2 rho\_0\\
&-3\,w\_y^2\sin\left(\frac{a\_wy\,\pi\,y}{L}\right)^2 rho\_0\\
&-u\_x^2\sin\left(\frac{a\_ux\,\pi\,x}{L}\right)^2 rho\_z\sin\left(\frac{a\_rhoz\,\pi\,z}{L}\right)\\
&-u\_x^2\sin\left(\frac{a\_ux\,\pi\,x}{L}\right)^2 rho\_x\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)\\
&-u\_x^2\sin\left(\frac{a\_ux\,\pi\,x}{L}\right)^2 rho\_y\cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)\\
&-u\_y^2\cos\left(\frac{a\_uy\,\pi\,y}{L}\right)^2 rho\_z\sin\left(\frac{a\_rhoz\,\pi\,z}{L}\right)\\
&-u\_y^2\cos\left(\frac{a\_uy\,\pi\,y}{L}\right)^2 rho\_x\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)\\
&-u\_y^2\cos\left(\frac{a\_uy\,\pi\,y}{L}\right)^2 rho\_y\cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)\\
&-u\_z^2\cos\left(\frac{a\_uz\,\pi\,z}{L}\right)^2 rho\_z\sin\left(\frac{a\_rhoz\,\pi\,z}{L}\right)\\
&-u\_z^2\cos\left(\frac{a\_uz\,\pi\,z}{L}\right)^2 rho\_x\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)\\
&-u\_z^2\cos\left(\frac{a\_uz\,\pi\,z}{L}\right)^2 rho\_y\cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)
\end{aligned}
$$

$$
\begin{aligned}
&+ u\_0^2\,\gamma\,rho\_z\sin\left(\frac{a\_rhoz\,\pi\,z}{L}\right) + u\_0^2\,\gamma\,rho\_x\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)\\
&+ u\_0^2\,\gamma\,rho\_y\cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right) - 2\,u\_0\,u\_x\sin\left(\frac{a\_ux\,\pi\,x}{L}\right)\,rho\_0\\
&- 2\,u\_0\,u\_y\cos\left(\frac{a\_uy\,\pi\,y}{L}\right)\,rho\_0 - 2\,u\_0\,u\_z\cos\left(\frac{a\_uz\,\pi\,z}{L}\right)\,rho\_0\\
&+ u\_x^2\sin\left(\frac{a\_ux\,\pi\,x}{L}\right)^2\gamma\,rho\_0 + u\_y^2\cos\left(\frac{a\_uy\,\pi\,y}{L}\right)^2\gamma\,rho\_0\\
&+ u\_z^2\cos\left(\frac{a\_uz\,\pi\,z}{L}\right)^2\gamma\,rho\_0 + \gamma\,v\_z^2\sin\left(\frac{a\_vz\,\pi\,z}{L}\right)^2 rho\_0\\
&+ \gamma\,v\_x^2\cos\left(\frac{a\_vx\,\pi\,x}{L}\right)^2 rho\_0 + \gamma\,v\_y^2\sin\left(\frac{a\_vy\,\pi\,y}{L}\right)^2 rho\_0\\
&+ 3\,\gamma\,w\_z^2\cos\left(\frac{a\_wz\,\pi\,z}{L}\right)^2 rho\_0 + 3\,\gamma\,w\_x^2\sin\left(\frac{a\_wx\,\pi\,x}{L}\right)^2 rho\_0\\
&+ 3\,\gamma\,w\_y^2\sin\left(\frac{a\_wy\,\pi\,y}{L}\right)^2 rho\_0 - 2\,v\_z\sin\left(\frac{a\_vz\,\pi\,z}{L}\right)v\_0\,rho\_0\\
&- 2\,v\_0\,v\_x\cos\left(\frac{a\_vx\,\pi\,x}{L}\right)\,rho\_0 - 2\,v\_0\,v\_y\sin\left(\frac{a\_vy\,\pi\,y}{L}\right)\,rho\_0\\
&+ \gamma\,v\_0^2\,rho\_z\sin\left(\frac{a\_rhoz\,\pi\,z}{L}\right) + \gamma\,v\_0^2\,rho\_x\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)\\
&+ \gamma\,v\_0^2\,rho\_y\cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right) + 3\,\gamma\,w\_0^2\,rho\_z\sin\left(\frac{a\_rhoz\,\pi\,z}{L}\right)\\
&+ 3\,\gamma\,w\_0^2\,rho\_x\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right) + 3\,\gamma\,w\_0^2\,rho\_y\cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)\\
&- 6\,w\_z\cos\left(\frac{a\_wz\,\pi\,z}{L}\right)w\_0\,rho\_0 - 6\,w\_0\,w\_x\sin\left(\frac{a\_wx\,\pi\,x}{L}\right)\,rho\_0\\
&- 6\,w\_0\,w\_y\sin\left(\frac{a\_wy\,\pi\,y}{L}\right)\,rho\_0\\
&- v\_z^2\sin\left(\frac{a\_vz\,\pi\,z}{L}\right)^2 rho\_z\sin\left(\frac{a\_rhoz\,\pi\,z}{L}\right)\\
&- v\_z^2\sin\left(\frac{a\_vz\,\pi\,z}{L}\right)^2 rho\_x\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)\\
&- v\_z^2\sin\left(\frac{a\_vz\,\pi\,z}{L}\right)^2 rho\_y\cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)\\
&- v\_x^2\cos\left(\frac{a\_vx\,\pi\,x}{L}\right)^2 rho\_z\sin\left(\frac{a\_rhoz\,\pi\,z}{L}\right)\\
&- v\_x^2\cos\left(\frac{a\_vx\,\pi\,x}{L}\right)^2 rho\_x\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)\\
&- v\_x^2\cos\left(\frac{a\_vx\,\pi\,x}{L}\right)^2 rho\_y\cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)
\end{aligned}
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\begin{aligned}
&- v\_y^2 \sin\left(\frac{a\_vy\,\pi\,y}{L}\right)^2 rho\_z \sin\left(\frac{a\_rhoz\,\pi\,z}{L}\right)\\
&- v\_y^2 \sin\left(\frac{a\_vy\,\pi\,y}{L}\right)^2 rho\_x \sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)\\
&- v\_y^2 \sin\left(\frac{a\_vy\,\pi\,y}{L}\right)^2 rho\_y \cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)\\
&- 3\ w\_z^2 \cos\left(\frac{a\_wz\,\pi\,z}{L}\right)^2 rho\_z \sin\left(\frac{a\_rhoz\,\pi\,z}{L}\right)\\
&- 3\ w\_z^2 \cos\left(\frac{a\_wz\,\pi\,z}{L}\right)^2 rho\_x \sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)\\
&- 3\ w\_z^2 \cos\left(\frac{a\_wz\,\pi\,z}{L}\right)^2 rho\_y \cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)\\
&- 3\ w\_x^2 \sin\left(\frac{a\_wx\,\pi\,x}{L}\right)^2 rho\_z \sin\left(\frac{a\_rhoz\,\pi\,z}{L}\right)\\
&- 3\ w\_x^2 \sin\left(\frac{a\_wx\,\pi\,x}{L}\right)^2 rho\_x \sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)\\
&- 3\ w\_x^2 \sin\left(\frac{a\_wx\,\pi\,x}{L}\right)^2 rho\_y \cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)\\
&- 3\ w\_y^2 \sin\left(\frac{a\_wy\,\pi\,y}{L}\right)^2 rho\_z \sin\left(\frac{a\_rhoz\,\pi\,z}{L}\right)\\
&- 3\ w\_y^2 \sin\left(\frac{a\_wy\,\pi\,y}{L}\right)^2 rho\_x \sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)\\
&- 3\ w\_y^2 \sin\left(\frac{a\_wy\,\pi\,y}{L}\right)^2 rho\_y \cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)\\
&+ 2\ u\_x \sin\left(\frac{a\_ux\,\pi\,x}{L}\right) u\_y \cos\left(\frac{a\_uy\,\pi\,y}{L}\right) \gamma\, rho\_z \sin\left(\frac{a\_rhoz\,\pi\,z}{L}\right)\\
&+ 2\ u\_x \sin\left(\frac{a\_ux\,\pi\,x}{L}\right) u\_y \cos\left(\frac{a\_uy\,\pi\,y}{L}\right) \gamma\, rho\_x \sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)\\
&+ 2\ u\_x \sin\left(\frac{a\_ux\,\pi\,x}{L}\right) u\_y \cos\left(\frac{a\_uy\,\pi\,y}{L}\right) \gamma\, rho\_y \cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)\\
&+ 2\ u\_x \sin\left(\frac{a\_ux\,\pi\,x}{L}\right) u\_z \cos\left(\frac{a\_uz\,\pi\,z}{L}\right) \gamma\, rho\_z \sin\left(\frac{a\_rhoz\,\pi\,z}{L}\right)\\
&+ 2\ u\_x \sin\left(\frac{a\_ux\,\pi\,x}{L}\right) u\_z \cos\left(\frac{a\_uz\,\pi\,z}{L}\right) \gamma\, rho\_x \sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)\\
&+ 2\ u\_x \sin\left(\frac{a\_ux\,\pi\,x}{L}\right) u\_z \cos\left(\frac{a\_uz\,\pi\,z}{L}\right) \gamma\, rho\_y \cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)\\
&+ 2\ u\_y \cos\left(\frac{a\_uy\,\pi\,y}{L}\right) u\_z \cos\left(\frac{a\_uz\,\pi\,z}{L}\right) \gamma\, rho\_z \sin\left(\frac{a\_rhoz\,\pi\,z}{L}\right)\\
&+ 2\ u\_y \cos\left(\frac{a\_uy\,\pi\,y}{L}\right) u\_z \cos\left(\frac{a\_uz\,\pi\,z}{L}\right) \gamma\, rho\_x \sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)
\end{aligned}
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\begin{aligned}
&+2\,u\_y\cos\left(\frac{a\_uy\,\pi\,y}{L}\right)\,u\_z\cos\left(\frac{a\_uz\,\pi\,z}{L}\right)\,\gamma\,rho\_y\cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)\\
&+2\,\gamma\,v\_z\sin\left(\frac{a\_vz\,\pi\,z}{L}\right)\,v\_x\cos\left(\frac{a\_vx\,\pi\,x}{L}\right)\,rho\_z\sin\left(\frac{a\_rhoz\,\pi\,z}{L}\right)\\
&+2\,\gamma\,v\_z\sin\left(\frac{a\_vz\,\pi\,z}{L}\right)\,v\_x\cos\left(\frac{a\_vx\,\pi\,x}{L}\right)\,rho\_x\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)\\
&+2\,\gamma\,v\_z\sin\left(\frac{a\_vz\,\pi\,z}{L}\right)\,v\_x\cos\left(\frac{a\_vx\,\pi\,x}{L}\right)\,rho\_y\cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)\\
&+2\,\gamma\,v\_z\sin\left(\frac{a\_vz\,\pi\,z}{L}\right)\,v\_y\sin\left(\frac{a\_vy\,\pi\,y}{L}\right)\,rho\_z\sin\left(\frac{a\_rhoz\,\pi\,z}{L}\right)\\
&+2\,\gamma\,v\_z\sin\left(\frac{a\_vz\,\pi\,z}{L}\right)\,v\_y\sin\left(\frac{a\_vy\,\pi\,y}{L}\right)\,rho\_x\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)\\
&+2\,\gamma\,v\_z\sin\left(\frac{a\_vz\,\pi\,z}{L}\right)\,v\_y\sin\left(\frac{a\_vy\,\pi\,y}{L}\right)\,rho\_y\cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)\\
&+2\,\gamma\,v\_x\cos\left(\frac{a\_vx\,\pi\,x}{L}\right)\,v\_y\sin\left(\frac{a\_vy\,\pi\,y}{L}\right)\,rho\_z\sin\left(\frac{a\_rhoz\,\pi\,z}{L}\right)\\
&+2\,\gamma\,v\_x\cos\left(\frac{a\_vx\,\pi\,x}{L}\right)\,v\_y\sin\left(\frac{a\_vy\,\pi\,y}{L}\right)\,rho\_x\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)\\
&+2\,\gamma\,v\_x\cos\left(\frac{a\_vx\,\pi\,x}{L}\right)\,v\_y\sin\left(\frac{a\_vy\,\pi\,y}{L}\right)\,rho\_y\cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)\\
&+6\,\gamma\,w\_z\cos\left(\frac{a\_wz\,\pi\,z}{L}\right)\,w\_x\sin\left(\frac{a\_wx\,\pi\,x}{L}\right)\,rho\_z\sin\left(\frac{a\_rhoz\,\pi\,z}{L}\right)\\
&+6\,\gamma\,w\_z\cos\left(\frac{a\_wz\,\pi\,z}{L}\right)\,w\_x\sin\left(\frac{a\_wx\,\pi\,x}{L}\right)\,rho\_x\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)\\
&+6\,\gamma\,w\_z\cos\left(\frac{a\_wz\,\pi\,z}{L}\right)\,w\_x\sin\left(\frac{a\_wx\,\pi\,x}{L}\right)\,rho\_y\cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)\\
&+6\,\gamma\,w\_z\cos\left(\frac{a\_wz\,\pi\,z}{L}\right)\,w\_y\sin\left(\frac{a\_wy\,\pi\,y}{L}\right)\,rho\_z\sin\left(\frac{a\_rhoz\,\pi\,z}{L}\right)\\
&+6\,\gamma\,w\_z\cos\left(\frac{a\_wz\,\pi\,z}{L}\right)\,w\_y\sin\left(\frac{a\_wy\,\pi\,y}{L}\right)\,rho\_x\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)\\
&+6\,\gamma\,w\_z\cos\left(\frac{a\_wz\,\pi\,z}{L}\right)\,w\_y\sin\left(\frac{a\_wy\,\pi\,y}{L}\right)\,rho\_y\cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)\\
&+6\,\gamma\,w\_x\sin\left(\frac{a\_wx\,\pi\,x}{L}\right)\,w\_y\sin\left(\frac{a\_wy\,\pi\,y}{L}\right)\,rho\_z\sin\left(\frac{a\_rhoz\,\pi\,z}{L}\right)\\
&+6\,\gamma\,w\_x\sin\left(\frac{a\_wx\,\pi\,x}{L}\right)\,w\_y\sin\left(\frac{a\_wy\,\pi\,y}{L}\right)\,rho\_x\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)\\
&+6\,\gamma\,w\_x\sin\left(\frac{a\_wx\,\pi\,x}{L}\right)\,w\_y\sin\left(\frac{a\_wy\,\pi\,y}{L}\right)\,rho\_y\cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)\\
&-2\,u\_x\sin\left(\frac{a\_ux\,\pi\,x}{L}\right)\,u\_y\cos\left(\frac{a\_uy\,\pi\,y}{L}\right)\,rho\_z\sin\left(\frac{a\_rhoz\,\pi\,z}{L}\right)
\end{aligned}
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\begin{aligned}
&-2\,u\_x\sin\left(\frac{a\_ux\pi\,x}{L}\right)u\_y\cos\left(\frac{a\_uy\pi\,y}{L}\right)rho\_x\sin\left(\frac{a\_rhox\pi\,x}{L}\right)\\
&-2\,u\_x\sin\left(\frac{a\_ux\pi\,x}{L}\right)u\_y\cos\left(\frac{a\_uy\pi\,y}{L}\right)rho\_y\cos\left(\frac{a\_rhoy\pi\,y}{L}\right)\\
&-2\,u\_x\sin\left(\frac{a\_ux\pi\,x}{L}\right)u\_z\cos\left(\frac{a\_uz\pi\,z}{L}\right)rho\_z\sin\left(\frac{a\_rhoz\pi\,z}{L}\right)\\
&-2\,u\_x\sin\left(\frac{a\_ux\pi\,x}{L}\right)u\_z\cos\left(\frac{a\_uz\pi\,z}{L}\right)rho\_x\sin\left(\frac{a\_rhox\pi\,x}{L}\right)\\
&-2\,u\_x\sin\left(\frac{a\_ux\pi\,x}{L}\right)u\_z\cos\left(\frac{a\_uz\pi\,z}{L}\right)rho\_y\cos\left(\frac{a\_rhoy\pi\,y}{L}\right)\\
&-2\,u\_y\cos\left(\frac{a\_uy\pi\,y}{L}\right)u\_z\cos\left(\frac{a\_uz\pi\,z}{L}\right)rho\_z\sin\left(\frac{a\_rhoz\pi\,z}{L}\right)\\
&-2\,u\_y\cos\left(\frac{a\_uy\pi\,y}{L}\right)u\_z\cos\left(\frac{a\_uz\pi\,z}{L}\right)rho\_x\sin\left(\frac{a\_rhox\pi\,x}{L}\right)\\
&-2\,u\_y\cos\left(\frac{a\_uy\pi\,y}{L}\right)u\_z\cos\left(\frac{a\_uz\pi\,z}{L}\right)rho\_y\cos\left(\frac{a\_rhoy\pi\,y}{L}\right)\\
&+2\,u\_0\,u\_x\sin\left(\frac{a\_ux\pi\,x}{L}\right)\gamma\,rho\_z\sin\left(\frac{a\_rhoz\pi\,z}{L}\right)\\
&+2\,u\_0\,u\_x\sin\left(\frac{a\_ux\pi\,x}{L}\right)\gamma\,rho\_x\sin\left(\frac{a\_rhox\pi\,x}{L}\right)\\
&+2\,u\_0\,u\_x\sin\left(\frac{a\_ux\pi\,x}{L}\right)\gamma\,rho\_y\cos\left(\frac{a\_rhoy\pi\,y}{L}\right)\\
&+2\,u\_0\,u\_z\cos\left(\frac{a\_uz\pi\,z}{L}\right)\gamma\,rho\_z\sin\left(\frac{a\_rhoz\pi\,z}{L}\right)\\
&+2\,u\_0\,u\_z\cos\left(\frac{a\_uz\pi\,z}{L}\right)\gamma\,rho\_x\sin\left(\frac{a\_rhox\pi\,x}{L}\right)\\
&+2\,u\_0\,u\_z\cos\left(\frac{a\_uz\pi\,z}{L}\right)\gamma\,rho\_y\cos\left(\frac{a\_rhoy\pi\,y}{L}\right)\\
&+2\,u\_0\,u\_y\cos\left(\frac{a\_uy\pi\,y}{L}\right)\gamma\,rho\_z\sin\left(\frac{a\_rhoz\pi\,z}{L}\right)\\
&+2\,u\_0\,u\_y\cos\left(\frac{a\_uy\pi\,y}{L}\right)\gamma\,rho\_x\sin\left(\frac{a\_rhox\pi\,x}{L}\right)\\
&+2\,u\_0\,u\_y\cos\left(\frac{a\_uy\pi\,y}{L}\right)\gamma\,rho\_y\cos\left(\frac{a\_rhoy\pi\,y}{L}\right)\\
&+2\,u\_x\sin\left(\frac{a\_ux\pi\,x}{L}\right)u\_y\cos\left(\frac{a\_uy\pi\,y}{L}\right)\gamma\,rho\_0\\
&+2\,u\_x\sin\left(\frac{a\_ux\pi\,x}{L}\right)u\_z\cos\left(\frac{a\_uz\pi\,z}{L}\right)\gamma\,rho\_0\\
&+2\,u\_y\cos\left(\frac{a\_uy\pi\,y}{L}\right)u\_z\cos\left(\frac{a\_uz\pi\,z}{L}\right)\gamma\,rho\_0
\end{aligned}
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\begin{aligned}
&+2\,\gamma\,v\_z\,\sin\left(\frac{a\_vz\,\pi\,z}{L}\right)\,v\_0\,rho\_z\,\sin\left(\frac{a\_rhoz\,\pi\,z}{L}\right)\\
&+2\,\gamma\,v\_z\,\sin\left(\frac{a\_vz\,\pi\,z}{L}\right)\,v\_0\,rho\_x\,\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)\\
&+2\,\gamma\,v\_z\,\sin\left(\frac{a\_vz\,\pi\,z}{L}\right)\,v\_0\,rho\_y\,\cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)\\
&+2\,\gamma\,v\_0\,v\_x\,\cos\left(\frac{a\_vx\,\pi\,x}{L}\right)\,rho\_z\,\sin\left(\frac{a\_rhoz\,\pi\,z}{L}\right)\\
&+2\,\gamma\,v\_0\,v\_x\,\cos\left(\frac{a\_vx\,\pi\,x}{L}\right)\,rho\_x\,\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)\\
&+2\,\gamma\,v\_0\,v\_x\,\cos\left(\frac{a\_vx\,\pi\,x}{L}\right)\,rho\_y\,\cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)\\
&+2\,\gamma\,v\_0\,v\_y\,\sin\left(\frac{a\_vy\,\pi\,y}{L}\right)\,rho\_z\,\sin\left(\frac{a\_rhoz\,\pi\,z}{L}\right)\\
&+2\,\gamma\,v\_0\,v\_y\,\sin\left(\frac{a\_vy\,\pi\,y}{L}\right)\,rho\_x\,\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)\\
&+2\,\gamma\,v\_0\,v\_y\,\sin\left(\frac{a\_vy\,\pi\,y}{L}\right)\,rho\_y\,\cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)\\
&-2\,v\_z\,\sin\left(\frac{a\_vz\,\pi\,z}{L}\right)\,v\_x\,\cos\left(\frac{a\_vx\,\pi\,x}{L}\right)\,rho\_z\,\sin\left(\frac{a\_rhoz\,\pi\,z}{L}\right)\\
&-2\,v\_z\,\sin\left(\frac{a\_vz\,\pi\,z}{L}\right)\,v\_x\,\cos\left(\frac{a\_vx\,\pi\,x}{L}\right)\,rho\_x\,\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)\\
&-2\,v\_z\,\sin\left(\frac{a\_vz\,\pi\,z}{L}\right)\,v\_x\,\cos\left(\frac{a\_vx\,\pi\,x}{L}\right)\,rho\_y\,\cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)\\
&-2\,v\_z\,\sin\left(\frac{a\_vz\,\pi\,z}{L}\right)\,v\_y\,\sin\left(\frac{a\_vy\,\pi\,y}{L}\right)\,rho\_z\,\sin\left(\frac{a\_rhoz\,\pi\,z}{L}\right)\\
&-2\,v\_z\,\sin\left(\frac{a\_vz\,\pi\,z}{L}\right)\,v\_y\,\sin\left(\frac{a\_vy\,\pi\,y}{L}\right)\,rho\_x\,\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)\\
&-2\,v\_z\,\sin\left(\frac{a\_vz\,\pi\,z}{L}\right)\,v\_y\,\sin\left(\frac{a\_vy\,\pi\,y}{L}\right)\,rho\_y\,\cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)\\
&-2\,v\_x\,\cos\left(\frac{a\_vx\,\pi\,x}{L}\right)\,v\_y\,\sin\left(\frac{a\_vy\,\pi\,y}{L}\right)\,rho\_z\,\sin\left(\frac{a\_rhoz\,\pi\,z}{L}\right)\\
&-2\,v\_x\,\cos\left(\frac{a\_vx\,\pi\,x}{L}\right)\,v\_y\,\sin\left(\frac{a\_vy\,\pi\,y}{L}\right)\,rho\_x\,\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)\\
&-2\,v\_x\,\cos\left(\frac{a\_vx\,\pi\,x}{L}\right)\,v\_y\,\sin\left(\frac{a\_vy\,\pi\,y}{L}\right)\,rho\_y\,\cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)\\
&-6\,w\_z\,\cos\left(\frac{a\_wz\,\pi\,z}{L}\right)\,w\_x\,\sin\left(\frac{a\_wx\,\pi\,x}{L}\right)\,rho\_z\,\sin\left(\frac{a\_rhoz\,\pi\,z}{L}\right)\\
&-6\,w\_z\,\cos\left(\frac{a\_wz\,\pi\,z}{L}\right)\,w\_x\,\sin\left(\frac{a\_wx\,\pi\,x}{L}\right)\,rho\_x\,\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)
\end{aligned}
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\begin{aligned}
&-6\, w\_z \cos\left(\frac{a\_wz\,\pi\, z}{L}\right) w\_x \sin\left(\frac{a\_wx\,\pi\, x}{L}\right) rho\_y \cos\left(\frac{a\_rhoy\,\pi\, y}{L}\right)\\
&-6\, w\_z \cos\left(\frac{a\_wz\,\pi\, z}{L}\right) w\_y \sin\left(\frac{a\_wy\,\pi\, y}{L}\right) rho\_z \sin\left(\frac{a\_rhoz\,\pi\, z}{L}\right)\\
&-6\, w\_z \cos\left(\frac{a\_wz\,\pi\, z}{L}\right) w\_y \sin\left(\frac{a\_wy\,\pi\, y}{L}\right) rho\_x \sin\left(\frac{a\_rhox\,\pi\, x}{L}\right)\\
&-6\, w\_z \cos\left(\frac{a\_wz\,\pi\, z}{L}\right) w\_y \sin\left(\frac{a\_wy\,\pi\, y}{L}\right) rho\_y \cos\left(\frac{a\_rhoy\,\pi\, y}{L}\right)\\
&-6\, w\_x \sin\left(\frac{a\_wx\,\pi\, x}{L}\right) w\_y \sin\left(\frac{a\_wy\,\pi\, y}{L}\right) rho\_z \sin\left(\frac{a\_rhoz\,\pi\, z}{L}\right)\\
&-6\, w\_x \sin\left(\frac{a\_wx\,\pi\, x}{L}\right) w\_y \sin\left(\frac{a\_wy\,\pi\, y}{L}\right) rho\_x \sin\left(\frac{a\_rhox\,\pi\, x}{L}\right)\\
&-6\, w\_x \sin\left(\frac{a\_wx\,\pi\, x}{L}\right) w\_y \sin\left(\frac{a\_wy\,\pi\, y}{L}\right) rho\_y \cos\left(\frac{a\_rhoy\,\pi\, y}{L}\right)\\
&+6\,\gamma\, w\_z \cos\left(\frac{a\_wz\,\pi\, z}{L}\right) w\_0\, rho\_z \sin\left(\frac{a\_rhoz\,\pi\, z}{L}\right)\\
&+6\,\gamma\, w\_z \cos\left(\frac{a\_wz\,\pi\, z}{L}\right) w\_0\, rho\_x \sin\left(\frac{a\_rhox\,\pi\, x}{L}\right)\\
&+6\,\gamma\, w\_z \cos\left(\frac{a\_wz\,\pi\, z}{L}\right) w\_0\, rho\_y \cos\left(\frac{a\_rhoy\,\pi\, y}{L}\right)\\
&+6\,\gamma\, w\_0\, w\_x \sin\left(\frac{a\_wx\,\pi\, x}{L}\right) rho\_z \sin\left(\frac{a\_rhoz\,\pi\, z}{L}\right)\\
&+6\,\gamma\, w\_0\, w\_x \sin\left(\frac{a\_wx\,\pi\, x}{L}\right) rho\_x \sin\left(\frac{a\_rhox\,\pi\, x}{L}\right)\\
&+6\,\gamma\, w\_0\, w\_x \sin\left(\frac{a\_wx\,\pi\, x}{L}\right) rho\_y \cos\left(\frac{a\_rhoy\,\pi\, y}{L}\right)\\
&+6\,\gamma\, w\_0\, w\_y \sin\left(\frac{a\_wy\,\pi\, y}{L}\right) rho\_z \sin\left(\frac{a\_rhoz\,\pi\, z}{L}\right)\\
&+6\,\gamma\, w\_0\, w\_y \sin\left(\frac{a\_wy\,\pi\, y}{L}\right) rho\_x \sin\left(\frac{a\_rhox\,\pi\, x}{L}\right)\\
&+6\,\gamma\, w\_0\, w\_y \sin\left(\frac{a\_wy\,\pi\, y}{L}\right) rho\_y \cos\left(\frac{a\_rhoy\,\pi\, y}{L}\right)\\
&+2\,\gamma\, v\_z \sin\left(\frac{a\_vz\,\pi\, z}{L}\right) v\_x \cos\left(\frac{a\_vx\,\pi\, x}{L}\right) rho\_0\\
&+2\,\gamma\, v\_z \sin\left(\frac{a\_vz\,\pi\, z}{L}\right) v\_y \sin\left(\frac{a\_vy\,\pi\, y}{L}\right) rho\_0\\
&+2\,\gamma\, v\_x \cos\left(\frac{a\_vx\,\pi\, x}{L}\right) v\_y \sin\left(\frac{a\_vy\,\pi\, y}{L}\right) rho\_0\\
&+6\,\gamma\, w\_z \cos\left(\frac{a\_wz\,\pi\, z}{L}\right) w\_x \sin\left(\frac{a\_wx\,\pi\, x}{L}\right) rho\_0
\end{aligned}
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\begin{aligned}
&+6\,\gamma\,w\_z\cos\left(\frac{a\_wz\,\pi\,z}{L}\right)\,w\_y\sin\left(\frac{a\_wy\,\pi\,y}{L}\right)\,rho\_0\\
&+6\,\gamma\,w\_x\sin\left(\frac{a\_wx\,\pi\,x}{L}\right)\,w\_y\sin\left(\frac{a\_wy\,\pi\,y}{L}\right)\,rho\_0\\
&-2\,u\_x\sin\left(\frac{a\_ux\,\pi\,x}{L}\right)\,u\_y\cos\left(\frac{a\_uy\,\pi\,y}{L}\right)\,rho\_0\\
&-2\,u\_x\sin\left(\frac{a\_ux\,\pi\,x}{L}\right)\,u\_z\cos\left(\frac{a\_uz\,\pi\,z}{L}\right)\,rho\_0\\
&-2\,u\_y\cos\left(\frac{a\_uy\,\pi\,y}{L}\right)\,u\_z\cos\left(\frac{a\_uz\,\pi\,z}{L}\right)\,rho\_0\\
&+2\,u\_0\,u\_x\sin\left(\frac{a\_ux\,\pi\,x}{L}\right)\,\gamma\,rho\_0+2\,u\_0\,u\_z\cos\left(\frac{a\_uz\,\pi\,z}{L}\right)\,\gamma\,rho\_0\\
&+2\,u\_0\,u\_y\cos\left(\frac{a\_uy\,\pi\,y}{L}\right)\,\gamma\,rho\_0\\
&-2\,u\_0\,u\_x\sin\left(\frac{a\_ux\,\pi\,x}{L}\right)\,rho\_z\sin\left(\frac{a\_rhoz\,\pi\,z}{L}\right)\\
&-2\,u\_0\,u\_x\sin\left(\frac{a\_ux\,\pi\,x}{L}\right)\,rho\_x\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)\\
&-2\,u\_0\,u\_x\sin\left(\frac{a\_ux\,\pi\,x}{L}\right)\,rho\_y\cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)\\
&-2\,u\_0\,u\_y\cos\left(\frac{a\_uy\,\pi\,y}{L}\right)\,rho\_z\sin\left(\frac{a\_rhoz\,\pi\,z}{L}\right)\\
&-2\,u\_0\,u\_y\cos\left(\frac{a\_uy\,\pi\,y}{L}\right)\,rho\_x\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)\\
&-2\,u\_0\,u\_y\cos\left(\frac{a\_uy\,\pi\,y}{L}\right)\,rho\_y\cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)\\
&-2\,u\_0\,u\_z\cos\left(\frac{a\_uz\,\pi\,z}{L}\right)\,rho\_z\sin\left(\frac{a\_rhoz\,\pi\,z}{L}\right)\\
&-2\,u\_0\,u\_z\cos\left(\frac{a\_uz\,\pi\,z}{L}\right)\,rho\_x\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)\\
&-2\,u\_0\,u\_z\cos\left(\frac{a\_uz\,\pi\,z}{L}\right)\,rho\_y\cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)\\
&+u\_x^2\sin\left(\frac{a\_ux\,\pi\,x}{L}\right)^2\,\gamma\,rho\_z\sin\left(\frac{a\_rhoz\,\pi\,z}{L}\right)\\
&+u\_x^2\sin\left(\frac{a\_ux\,\pi\,x}{L}\right)^2\,\gamma\,rho\_x\sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)\\
&+u\_x^2\sin\left(\frac{a\_ux\,\pi\,x}{L}\right)^2\,\gamma\,rho\_y\cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)\\
&+u\_y^2\cos\left(\frac{a\_uy\,\pi\,y}{L}\right)^2\,\gamma\,rho\_z\sin\left(\frac{a\_rhoz\,\pi\,z}{L}\right)
\end{aligned}
$$

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\begin{aligned}
&+ u\_y^2 \cos\left(\frac{a\_uy\,\pi\,y}{L}\right)^2 \gamma\, rho\_x \sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)\\
&+ u\_y^2 \cos\left(\frac{a\_uy\,\pi\,y}{L}\right)^2 \gamma\, rho\_y \cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)\\
&+ u\_z^2 \cos\left(\frac{a\_uz\,\pi\,z}{L}\right)^2 \gamma\, rho\_z \sin\left(\frac{a\_rhoz\,\pi\,z}{L}\right)\\
&+ u\_z^2 \cos\left(\frac{a\_uz\,\pi\,z}{L}\right)^2 \gamma\, rho\_x \sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)\\
&+ u\_z^2 \cos\left(\frac{a\_uz\,\pi\,z}{L}\right)^2 \gamma\, rho\_y \cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)\\
&+ 2\,\gamma\, v\_z \sin\left(\frac{a\_vz\,\pi\,z}{L}\right) v\_0\, rho\_0 + 2\,\gamma\, v\_0\, v\_x \cos\left(\frac{a\_vx\,\pi\,x}{L}\right) rho\_0\\
&+ 2\,\gamma\, v\_0\, v\_y \sin\left(\frac{a\_vy\,\pi\,y}{L}\right) rho\_0\\
&- 2\, v\_z \sin\left(\frac{a\_vz\,\pi\,z}{L}\right) v\_x \cos\left(\frac{a\_vx\,\pi\,x}{L}\right) rho\_0\\
&- 2\, v\_z \sin\left(\frac{a\_vz\,\pi\,z}{L}\right) v\_y \sin\left(\frac{a\_vy\,\pi\,y}{L}\right) rho\_0\\
&- 2\, v\_x \cos\left(\frac{a\_vx\,\pi\,x}{L}\right) v\_y \sin\left(\frac{a\_vy\,\pi\,y}{L}\right) rho\_0\\
&+ \gamma\, v\_z^2 \sin\left(\frac{a\_vz\,\pi\,z}{L}\right)^2 rho\_z \sin\left(\frac{a\_rhoz\,\pi\,z}{L}\right)\\
&+ \gamma\, v\_z^2 \sin\left(\frac{a\_vz\,\pi\,z}{L}\right)^2 rho\_x \sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)\\
&+ \gamma\, v\_z^2 \sin\left(\frac{a\_vz\,\pi\,z}{L}\right)^2 rho\_y \cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)\\
&+ \gamma\, v\_x^2 \cos\left(\frac{a\_vx\,\pi\,x}{L}\right)^2 rho\_z \sin\left(\frac{a\_rhoz\,\pi\,z}{L}\right)\\
&+ \gamma\, v\_x^2 \cos\left(\frac{a\_vx\,\pi\,x}{L}\right)^2 rho\_x \sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)\\
&+ \gamma\, v\_x^2 \cos\left(\frac{a\_vx\,\pi\,x}{L}\right)^2 rho\_y \cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)\\
&+ \gamma\, v\_y^2 \sin\left(\frac{a\_vy\,\pi\,y}{L}\right)^2 rho\_z \sin\left(\frac{a\_rhoz\,\pi\,z}{L}\right)\\
&+ \gamma\, v\_y^2 \sin\left(\frac{a\_vy\,\pi\,y}{L}\right)^2 rho\_x \sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)\\
&+ \gamma\, v\_y^2 \sin\left(\frac{a\_vy\,\pi\,y}{L}\right)^2 rho\_y \cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)\\
&- 6\, w\_z \cos\left(\frac{a\_wz\,\pi\,z}{L}\right) w\_x \sin\left(\frac{a\_wx\,\pi\,x}{L}\right) rho\_0
\end{aligned}
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\begin{aligned}
&-6\, w\_z \cos\left(\frac{a\_wz\,\pi\, z}{L}\right) w\_y \sin\left(\frac{a\_wy\,\pi\, y}{L}\right) rho\_0 \\
&-6\, w\_x \sin\left(\frac{a\_wx\,\pi\, x}{L}\right) w\_y \sin\left(\frac{a\_wy\,\pi\, y}{L}\right) rho\_0 \\
&+6\,\gamma\, w\_z \cos\left(\frac{a\_wz\,\pi\, z}{L}\right) w\_0\, rho\_0 + 6\,\gamma\, w\_0\, w\_x \sin\left(\frac{a\_wx\,\pi\, x}{L}\right) rho\_0 \\
&+6\,\gamma\, w\_0\, w\_y \sin\left(\frac{a\_wy\,\pi\, y}{L}\right) rho\_0 \\
&+3\,\gamma\, w\_z^2 \cos\left(\frac{a\_wz\,\pi\, z}{L}\right)^2 rho\_z \sin\left(\frac{a\_rhoz\,\pi\, z}{L}\right) \\
&+3\,\gamma\, w\_z^2 \cos\left(\frac{a\_wz\,\pi\, z}{L}\right)^2 rho\_x \sin\left(\frac{a\_rhox\,\pi\, x}{L}\right) \\
&+3\,\gamma\, w\_z^2 \cos\left(\frac{a\_wz\,\pi\, z}{L}\right)^2 rho\_y \cos\left(\frac{a\_rhoy\,\pi\, y}{L}\right) \\
&+3\,\gamma\, w\_x^2 \sin\left(\frac{a\_wx\,\pi\, x}{L}\right)^2 rho\_z \sin\left(\frac{a\_rhoz\,\pi\, z}{L}\right) \\
&+3\,\gamma\, w\_x^2 \sin\left(\frac{a\_wx\,\pi\, x}{L}\right)^2 rho\_x \sin\left(\frac{a\_rhox\,\pi\, x}{L}\right) \\
&+3\,\gamma\, w\_x^2 \sin\left(\frac{a\_wx\,\pi\, x}{L}\right)^2 rho\_y \cos\left(\frac{a\_rhoy\,\pi\, y}{L}\right) \\
&+3\,\gamma\, w\_y^2 \sin\left(\frac{a\_wy\,\pi\, y}{L}\right)^2 rho\_z \sin\left(\frac{a\_rhoz\,\pi\, z}{L}\right) \\
&+3\,\gamma\, w\_y^2 \sin\left(\frac{a\_wy\,\pi\, y}{L}\right)^2 rho\_x \sin\left(\frac{a\_rhox\,\pi\, x}{L}\right) \\
&+3\,\gamma\, w\_y^2 \sin\left(\frac{a\_wy\,\pi\, y}{L}\right)^2 rho\_y \cos\left(\frac{a\_rhoy\,\pi\, y}{L}\right) \\
&-2\, v\_z \sin\left(\frac{a\_vz\,\pi\, z}{L}\right) v\_0\, rho\_z \sin\left(\frac{a\_rhoz\,\pi\, z}{L}\right) \\
&-2\, v\_z \sin\left(\frac{a\_vz\,\pi\, z}{L}\right) v\_0\, rho\_x \sin\left(\frac{a\_rhox\,\pi\, x}{L}\right) \\
&-2\, v\_z \sin\left(\frac{a\_vz\,\pi\, z}{L}\right) v\_0\, rho\_y \cos\left(\frac{a\_rhoy\,\pi\, y}{L}\right) \\
&-2\, v\_0\, v\_x \cos\left(\frac{a\_vx\,\pi\, x}{L}\right) rho\_z \sin\left(\frac{a\_rhoz\,\pi\, z}{L}\right) \\
&-2\, v\_0\, v\_x \cos\left(\frac{a\_vx\,\pi\, x}{L}\right) rho\_x \sin\left(\frac{a\_rhox\,\pi\, x}{L}\right) \\
&-2\, v\_0\, v\_x \cos\left(\frac{a\_vx\,\pi\, x}{L}\right) rho\_y \cos\left(\frac{a\_rhoy\,\pi\, y}{L}\right) \\
&-2\, v\_0\, v\_y \sin\left(\frac{a\_vy\,\pi\, y}{L}\right) rho\_z \sin\left(\frac{a\_rhoz\,\pi\, z}{L}\right)
\end{aligned}
$$

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\begin{aligned}
&-2\ v\_0\, v\_y \sin\left(\frac{a\_vy\,\pi\,y}{L}\right) rho\_x \sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)\\
&-2\ v\_0\, v\_y \sin\left(\frac{a\_vy\,\pi\,y}{L}\right) rho\_y \cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)\\
&-6\ w\_z \cos\left(\frac{a\_wz\,\pi\,z}{L}\right) w\_0\, rho\_z \sin\left(\frac{a\_rhoz\,\pi\,z}{L}\right)\\
&-6\ w\_z \cos\left(\frac{a\_wz\,\pi\,z}{L}\right) w\_0\, rho\_x \sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)\\
&-6\ w\_z \cos\left(\frac{a\_wz\,\pi\,z}{L}\right) w\_0\, rho\_y \cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)\\
&-6\ w\_0\, w\_x \sin\left(\frac{a\_wx\,\pi\,x}{L}\right) rho\_z \sin\left(\frac{a\_rhoz\,\pi\,z}{L}\right)\\
&-6\ w\_0\, w\_x \sin\left(\frac{a\_wx\,\pi\,x}{L}\right) rho\_x \sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)\\
&-6\ w\_0\, w\_x \sin\left(\frac{a\_wx\,\pi\,x}{L}\right) rho\_y \cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)\\
&-6\ w\_0\, w\_y \sin\left(\frac{a\_wy\,\pi\,y}{L}\right) rho\_z \sin\left(\frac{a\_rhoz\,\pi\,z}{L}\right)\\
&-6\ w\_0\, w\_y \sin\left(\frac{a\_wy\,\pi\,y}{L}\right) rho\_x \sin\left(\frac{a\_rhox\,\pi\,x}{L}\right)\\
&-6\ w\_0\, w\_y \sin\left(\frac{a\_wy\,\pi\,y}{L}\right) rho\_y \cos\left(\frac{a\_rhoy\,\pi\,y}{L}\right)\Bigg)\\
&w\_z \sin\left(\frac{a\_wz\,\pi\,z}{L}\right) a\_wz\,\pi\Bigg)
\end{aligned}
$$