Continuum mass and momentum

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$E-S+G=A$

$\rho v_x|_x \Delta y \Delta z\text{-}\rho v_x|_{x+\Delta x}\Delta y\Delta z\Delta t+\rho v_y|_y \Delta x\Delta z\Delta t\text{-}\rho v_Y|_{y+\Delta y}\Delta x\Delta z\Delta t+\rho v_z|_z\Delta x\Delta z\Delta t\text{-}\rho v_z|_{z+\Delta z}\Delta x\Delta z\Delta t=\rho|_{t+\Delta t}\Delta x\Delta y\Delta z-\rho|_t\Delta x\Delta y\Delta z$

$\frac{\rho v_x|_x-\rho v_x|_{x+\Delta x}}{\Delta x}+\frac{\rho v_y|_y-\rho v_y|_{y+\Delta y}}{\Delta y}+\frac{\rho v_z|_z-\rho v_z|_{z+\Delta z}}{\Delta z}=\frac{\rho|_{t+\Delta t}-\rho v|_t}{\Delta t}$

$\frac{\partial f}{\partial x}=\lim_{h\to 0}\frac{f(x+h)-f(x)}{h}$

$\frac{\partial}{\partial x}(\rho v_x)+\frac{\partial}{\partial y}(\rho v_y)+\frac{\partial}{\partial z}(\rho v_z)+\frac{\partial \rho}{\partial t}=0$

$\frac{\partial \rho}{\partial t}+\nabla\cdot(\rho\vec{v})=0$

$\frac{\partial \rho}{\partial t}+\nabla\cdot(\rho\vec{v})=0$

$\nabla\cdot(\rho\vec{v}):Advenction$

$\frac{\partial \rho}{\partial t}:Accumulation$

$\nabla\cdot\vec{v}=0$

$E-S+G=A$

X axis only:

$\rho v_x v_x|_x \Delta y\Delta z\Delta t\text{-}\rho v_x v_x|_{x+\Delta x}\Delta y\Delta z\Delta t+\rho v_x v_y|_y\Delta x\Delta z\Delta t\text{-}\rho v_x v_y|_{y+\Delta y}\Delta x\Delta z\Delta t+\rho v_x v_z|_z\Delta x\Delta y\Delta t\text{-}\rho v_x v_z|_{z+\Delta z}\Delta x\Delta y\Delta t+$
$\tau_{xx}|_x\Delta y\Delta z\Delta t-\tau_{xx}|_{x+\Delta x}\Delta y\Delta z\Delta t+\tau_{yx}|_y\Delta x\Delta z\Delta t-\tau_{xy}|_{y+\Delta y}\Delta x\Delta z\Delta t+\tau_{xz}|_z\Delta x\Delta y\Delta t-\tau_{xz}|_{z+\Delta z}\Delta x\Delta y\Delta t+P|_x\Delta y\Delta z\Delta t-$
$P|_{x+\Delta x}\Delta y\Delta z\Delta t+\rho g_x\Delta x\Delta y\Delta z\Delta t=\rho v_x|_{t+\Delta t}\Delta x\Delta y\Delta z-\rho v_x|_t\Delta x\Delta y\Delta z$

$\frac{\rho v_x v_x|_x\text{-}\rho v_x v_x|_{x+\Delta x}}{\Delta x}+\frac{\rho v_x v_y|_y\text{-}\rho v_y v_y|_{y+\Delta y}}{\Delta y}+\frac{\rho v_x v_z|_z\text{-}\rho v_x v_z|_{z+\Delta z}}{\Delta z}+\frac{\tau_{xx}|_x-\tau_{xx}|_{x+\Delta x}}{\Delta x}+\frac{\tau_{yx}|_y-\tau_{yx}|_{y+\Delta y}}{\Delta y}+\frac{\tau_{xz}|_z-\tau_{xz}|_{z+\Delta z}}{\Delta z}$
$+\frac{P|_x-P|_{x+\Delta x}}{\Delta x}+\rho g_x=\frac{\rho v_x|_{t+\Delta t}-\rho v_x|_t}{\Delta t}$

$\frac{\partial f}{\partial x}=\lim_{h\to 0}\frac{f(x+h)-f(x)}{h}$

$\frac{\partial}{\partial x}(\rho v_x v_x)+\frac{\partial}{\partial y}(\rho v_x v_y)+\frac{\partial}{\partial z}(\rho v_x v_z)+\frac{\partial}{\partial x}\tau_{xx}+\frac{\partial}{\partial y}\tau_{xy}+\frac{\partial}{\partial z}\tau_{xz}+\frac{\partial}{\partial z}P-pg_x+\frac{\partial}{\partial x}(\rho v_x)=0$

So:

$\frac{\partial}{\partial t}(\rho\vec{v})+\nabla\cdot(\rho\vec{v}\,\vec{v})+\nabla\cdot\vec{\tau}+\nabla P-pg=0$

Resumed:

$\rho\frac{\partial\vec{v}}{\partial t}+\rho\vec{v}\nabla\cdot\vec{v}+\Delta\cdot\vec{\tau}+\Delta P-\rho g=0$

Only newton flows:

$\rho\frac{\partial v^{\rightarrow}}{\partial t}+\rho\vec{v}\nabla\cdot\vec{v}+\mu\Delta^2\vec{v}+\Delta P-\rho g=0$