

Does the conservative flux mean the following?

$$\Gamma \begin{pmatrix} -ux \\ -uy \\ -uz \end{pmatrix} = \begin{pmatrix} -\frac{\partial u}{\partial x} \\ -\frac{\partial u}{\partial y} \\ -\frac{\partial u}{\partial z} \end{pmatrix} ; \quad \Gamma \begin{pmatrix} -uxt \\ -uyt \\ -uzt \end{pmatrix} = \begin{pmatrix} -\frac{\partial^2 u}{\partial x \partial t} \\ -\frac{\partial^2 u}{\partial y \partial t} \\ -\frac{\partial^2 u}{\partial z \partial t} \end{pmatrix}$$

I have used uxt, uyt and uzt. Because if I use utx, uty, utz (as you told), comsol gives an error message of "variable not defined".

Note: "u" is a scalar quantity

The constant "X₄" cannot be deleted from the first term in the RHS of the equation.

Finally,

$$\Gamma \begin{pmatrix} -ux - X_4 * uxt \\ -uy - X_4 * uyt \\ -uz - X_4 * uzt \end{pmatrix} = \begin{pmatrix} -\frac{\partial u}{\partial x} - \frac{\partial^2 u}{\partial x \partial t} \\ -\frac{\partial u}{\partial y} - \frac{\partial^2 u}{\partial y \partial t} \\ -\frac{\partial u}{\partial z} - \frac{\partial^2 u}{\partial z \partial t} \end{pmatrix}$$

$$\nabla \cdot \Gamma \begin{pmatrix} -ux - uxt \\ -uy - uyt \\ -uz - uzt \end{pmatrix} = \begin{pmatrix} \frac{\partial}{\partial x} \\ \frac{\partial}{\partial y} \\ \frac{\partial}{\partial z} \end{pmatrix} \cdot \begin{pmatrix} -\frac{\partial u}{\partial x} - \frac{\partial^2 u}{\partial x \partial t} \\ -\frac{\partial u}{\partial y} - \frac{\partial^2 u}{\partial y \partial t} \\ -\frac{\partial u}{\partial z} - \frac{\partial^2 u}{\partial z \partial t} \end{pmatrix}$$