```
> restart; read(`NLElast.map`);
>
> interface(labeling=false,echo=4,quiet=true,showassumed=0):
Warning, new definition for norm
Warning, new definition for trace
```

$$ndim := 2$$

$$coords := x_{-1}, x_{-2}$$

$$x_{-1} := r$$

$$x_{-2} := \phi$$

$$x_{-3} := z$$

$$rpos_1(r, \phi) := r\cos(\phi)$$

$$rpos_2(r, \phi) := r\sin(\phi)$$

$$rpos_3(r, \phi) := z$$

$$\textit{Covariant undeformed base vectors (in columns of matrix)=}, \begin{bmatrix} \cos(\phi) & -r\sin(\phi) \\ \sin(\phi) & r\cos(\phi) \end{bmatrix}$$

$$\textit{Covariant undeformed metric tensor=}, \begin{bmatrix} 1 & 0 \\ 0 & r^2 \end{bmatrix}$$

$$\textit{Contravariant undeformed metric tensor=}, \begin{bmatrix} 1 & 0 \\ 0 & \frac{1}{r^2} \end{bmatrix}$$

$$\textit{Contravariant undeformed base vectors (in columns of matrix)=}, \begin{bmatrix} \cos(\phi) & -\frac{\sin(\phi)}{r} \\ \sin(\phi) & \frac{\cos(\phi)}{r} \end{bmatrix}$$

$$\textit{Test orthogonality of Co- and Contravariant undeformed base vectors=}, \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$$

Undeformed Christoffel symbols=, array(1 .. 2, 1 .. 2, -2 .. -1, [

$(1, 1, -2) = 0$

$(1, 1, -1) = 0$

$(1, 2, -2) = \frac{1}{r}$

$(1, 2, -1) = 0$

$(2, 1, -2) = \frac{1}{r}$

$(2, 1, -1) = 0$

$(2, 2, -2) = 0$

$(2, 2, -1) = -r$

])

$$PhysCompList := \left[b_{-1} = b^*_{-1},\ b_{-2} = \frac{b^*_{-2}}{r},\ u_{-1}(r, \phi) = u^*_{-1}(r, \phi),\ u_{-2}(r, \phi) = \frac{u^*_{-2}(r, \phi)}{r}, \right.$$

$$\left. \tau_{-1,-1} = T^*_{-1,-1},\ \tau_{-1,-2} = \frac{T^*_{-1,-2}}{r},\ \tau_{-1,-2} = \frac{T^*_{-2,-1}}{r},\ \tau_{-2,-2} = \frac{T^*_{-2,-2}}{r^2} \right]$$

$$LinElast_1 := \left(\frac{\partial}{\partial r} \tau_{-1,-1}\right) + \left(\frac{\partial}{\partial \phi} \tau_{-1,-2}\right) + \frac{\tau_{-1,-1}}{r} - r\,\tau_{-2,-2} + \rho\, b_{-1}$$

$$LinElast_2 := \left(\frac{\partial}{\partial r} \tau_{-1,-2}\right) + 3\,\frac{\tau_{-1,-2}}{r} + \left(\frac{\partial}{\partial \phi} \tau_{-2,-2}\right) + \rho\, b_{-2}$$

$$LinElastPhys_1 := \frac{\left(\frac{\partial}{\partial r} T^*_{-1,-1}\right) r + \left(\frac{\partial}{\partial \phi} \frac{T^*_{-1,-2}}{r}\right) r + T^*_{-1,-1} - T^*_{-2,-2} + \rho\, b^*_{-1}\, r}{r}$$

$$LinElastPhys_2 := \frac{\left(\frac{\partial}{\partial r} \frac{T^*_{-1,-2}}{r}\right) r^2 + 3\, T^*_{-1,-2} + \left(\frac{\partial}{\partial \phi} \frac{T^*_{-2,-2}}{r^2}\right) r^2 + \rho\, b^*_{-2}\, r}{r^2}$$

$$uvec_1 := u_{-1}(r, \phi)\cos(\phi) - u_{-2}(r, \phi)\, r\sin(\phi)$$

$$uvec_2 := u_{-1}(r, \phi)\sin(\phi) + u_{-2}(r, \phi)\, r\cos(\phi)$$

$$Rpos_1(r, \phi) := r\cos(\phi) + u_{-1}(r, \phi)\cos(\phi) - u_{-2}(r, \phi)\, r\sin(\phi)$$

$$Rpos_2(r, \phi) := r\sin(\phi) + u_{-1}(r, \phi)\sin(\phi) + u_{-2}(r, \phi)\, r\cos(\phi)$$

Covariant deformed base vectors (in columns of matrix)=,

$$\left[\cos(\phi) + \left(\frac{\partial}{\partial r} u_{-1}(r, \phi)\right)\cos(\phi) - \left(\frac{\partial}{\partial r} u_{-2}(r, \phi)\right) r\sin(\phi) - u_{-2}(r, \phi)\sin(\phi)\ ,\ -r\sin(\phi) \right.$$

$$\left. + \left(\frac{\partial}{\partial \phi} u_{-1}(r, \phi)\right)\cos(\phi) - u_{-1}(r, \phi)\sin(\phi) - \left(\frac{\partial}{\partial \phi} u_{-2}(r, \phi)\right) r\sin(\phi) - u_{-2}(r, \phi)\, r\cos(\phi) \right]$$

$$\left[\sin(\phi) + \left(\frac{\partial}{\partial r} u_{-1}(r, \phi)\right)\sin(\phi) + \left(\frac{\partial}{\partial r} u_{-2}(r, \phi)\right) r\cos(\phi) + u_{-2}(r, \phi)\cos(\phi)\ ,\ r\cos(\phi) \right.$$

$$\left. + \left(\frac{\partial}{\partial \phi} u_{-1}(r, \phi)\right)\sin(\phi) + u_{-1}(r, \phi)\cos(\phi) + \left(\frac{\partial}{\partial \phi} u_{-2}(r, \phi)\right) r\cos(\phi) - u_{-2}(r, \phi)\, r\sin(\phi) \right]$$

Covariant deformed metric tensor=,

$$\left[\left[\left(\frac{\partial}{\partial r} u_{-2}(r, \phi)\right)^2 r^2 + 2\left(\frac{\partial}{\partial r} u_{-2}(r, \phi)\right) r\, u_{-2}(r, \phi) + u_{-2}(r, \phi)^2 + 1 + 2\left(\frac{\partial}{\partial r} u_{-1}(r, \phi)\right) \right. \right.$$

$$+ \left(\frac{\partial}{\partial r} u_{-1}(r, \phi)\right)^2,\ \left(\frac{\partial}{\partial r} u_{-2}(r, \phi)\right) r\, u_{-1}(r, \phi) + \left(\frac{\partial}{\partial r} u_{-2}(r, \phi)\right) r^2 \left(\frac{\partial}{\partial \phi} u_{-2}(r, \phi)\right)$$

$$+ u_{-2}(r, \phi)\left(\frac{\partial}{\partial \phi} u_{-2}(r, \phi)\right) r + \left(\frac{\partial}{\partial r} u_{-2}(r, \phi)\right) r^2 + u_{-2}(r, \phi)\, u_{-1}(r, \phi) + \left(\frac{\partial}{\partial \phi} u_{-1}(r, \phi)\right)$$

$$-\left(\frac{\partial}{\partial r} u_{-1}(r, \phi)\right) u_{-2}(r, \phi)\, r + \left(\frac{\partial}{\partial r} u_{-1}(r, \phi)\right)\left(\frac{\partial}{\partial \phi} u_{-1}(r, \phi)\right)\Big]\Big]$$

$$\Big[\Big[\left(\frac{\partial}{\partial r} u_{-2}(r, \phi)\right) r\, u_{-1}(r, \phi) + \left(\frac{\partial}{\partial r} u_{-2}(r, \phi)\right) r^2 \left(\frac{\partial}{\partial \phi} u_{-2}(r, \phi)\right) + u_{-2}(r, \phi) \left(\frac{\partial}{\partial \phi} u_{-2}(r, \phi)\right) r$$

$$+ \left(\frac{\partial}{\partial r} u_{-2}(r, \phi)\right) r^2 + u_{-2}(r, \phi)\, u_{-1}(r, \phi) + \left(\frac{\partial}{\partial \phi} u_{-1}(r, \phi)\right) - \left(\frac{\partial}{\partial r} u_{-1}(r, \phi)\right) u_{-2}(r, \phi)\, r$$

$$+ \left(\frac{\partial}{\partial r} u_{-1}(r, \phi)\right)\left(\frac{\partial}{\partial \phi} u_{-1}(r, \phi)\right), 2\, u_{-1}(r, \phi) \left(\frac{\partial}{\partial \phi} u_{-2}(r, \phi)\right) r + r^2 + u_{-2}(r, \phi)^2\, r^2$$

$$+ \left(\frac{\partial}{\partial \phi} u_{-1}(r, \phi)\right)^2 + u_{-1}(r, \phi)^2 + 2\, r^2 \left(\frac{\partial}{\partial \phi} u_{-2}(r, \phi)\right) + \left(\frac{\partial}{\partial \phi} u_{-2}(r, \phi)\right)^2 r^2 + 2\, r\, u_{-1}(r, \phi)$$

$$- 2 \left(\frac{\partial}{\partial \phi} u_{-1}(r, \phi)\right) u_{-2}(r, \phi)\, r\Big]$$

Full nonlinear strain tensor=,

$$\Big[$$

$$\frac{1}{2}\left(\frac{\partial}{\partial r} u_{-2}(r, \phi)\right)^2 r^2 + \left(\frac{\partial}{\partial r} u_{-2}(r, \phi)\right) r\, u_{-2}(r, \phi) + \frac{1}{2} u_{-2}(r, \phi)^2 + \left(\frac{\partial}{\partial r} u_{-1}(r, \phi)\right) + \frac{1}{2}\left(\frac{\partial}{\partial r} u_{-1}(r, \phi)\right)^2$$

$$, \frac{1}{2}\left(\frac{\partial}{\partial r} u_{-2}(r, \phi)\right) r\, u_{-1}(r, \phi) + \frac{1}{2}\left(\frac{\partial}{\partial r} u_{-2}(r, \phi)\right) r^2 \left(\frac{\partial}{\partial \phi} u_{-2}(r, \phi)\right) + \frac{1}{2} u_{-2}(r, \phi)\left(\frac{\partial}{\partial \phi} u_{-2}(r, \phi)\right) r$$

$$+ \frac{1}{2}\left(\frac{\partial}{\partial r} u_{-2}(r, \phi)\right) r^2 + \frac{1}{2} u_{-2}(r, \phi)\, u_{-1}(r, \phi) + \frac{1}{2}\left(\frac{\partial}{\partial \phi} u_{-1}(r, \phi)\right) - \frac{1}{2}\left(\frac{\partial}{\partial r} u_{-1}(r, \phi)\right) u_{-2}(r, \phi)\, r$$

$$+ \frac{1}{2}\left(\frac{\partial}{\partial r} u_{-1}(r, \phi)\right)\left(\frac{\partial}{\partial \phi} u_{-1}(r, \phi)\right)\Big]\Big]$$

$$\Big[\frac{1}{2}\left(\frac{\partial}{\partial r} u_{-2}(r, \phi)\right) r\, u_{-1}(r, \phi) + \frac{1}{2}\left(\frac{\partial}{\partial r} u_{-2}(r, \phi)\right) r^2 \left(\frac{\partial}{\partial \phi} u_{-2}(r, \phi)\right) + \frac{1}{2} u_{-2}(r, \phi)\left(\frac{\partial}{\partial \phi} u_{-2}(r, \phi)\right) r$$

$$+ \frac{1}{2}\left(\frac{\partial}{\partial r} u_{-2}(r, \phi)\right) r^2 + \frac{1}{2} u_{-2}(r, \phi)\, u_{-1}(r, \phi) + \frac{1}{2}\left(\frac{\partial}{\partial \phi} u_{-1}(r, \phi)\right) - \frac{1}{2}\left(\frac{\partial}{\partial r} u_{-1}(r, \phi)\right) u_{-2}(r, \phi)\, r$$

$$+ \frac{1}{2}\left(\frac{\partial}{\partial r} u_{-1}(r, \phi)\right)\left(\frac{\partial}{\partial \phi} u_{-1}(r, \phi)\right), u_{-1}(r, \phi)\left(\frac{\partial}{\partial \phi} u_{-2}(r, \phi)\right) r + \frac{1}{2} u_{-2}(r, \phi)^2\, r^2 + \frac{1}{2}\left(\frac{\partial}{\partial \phi} u_{-1}(r, \phi)\right)^2$$

$$+ \frac{1}{2} u_{-1}(r, \phi)^2 + r^2\left(\frac{\partial}{\partial \phi} u_{-2}(r, \phi)\right) + \frac{1}{2}\left(\frac{\partial}{\partial \phi} u_{-2}(r, \phi)\right)^2 r^2 + r\, u_{-1}(r, \phi) - \left(\frac{\partial}{\partial \phi} u_{-1}(r, \phi)\right) u_{-2}(r, \phi)\, r$$

$$\Big]$$

Linear strain tensor=,

$$\begin{bmatrix} \frac{\partial}{\partial r} u_{-1}(r, \phi) & \frac{1}{2}\left(\frac{\partial}{\partial r} u_{-2}(r, \phi)\right) r^2 + \frac{1}{2}\left(\frac{\partial}{\partial \phi} u_{-1}(r, \phi)\right) \\ \frac{1}{2}\left(\frac{\partial}{\partial r} u_{-2}(r, \phi)\right) r^2 + \frac{1}{2}\left(\frac{\partial}{\partial \phi} u_{-1}(r, \phi)\right) & r\, u_{-1}(r, \phi) + r^2\left(\frac{\partial}{\partial \phi} u_{-2}(r, \phi)\right) \end{bmatrix}$$

Linear strain tensor in phys. comp.=,

$$\begin{bmatrix} \frac{\partial}{\partial r} u^*_{-1}(r, \phi), & \frac{1}{2}\,\frac{\left(\frac{\partial}{\partial r} u^*_{-2}(r, \phi)\right) r - u^*_{-2}(r, \phi) + \left(\frac{\partial}{\partial \phi} u^*_{-1}(r, \phi)\right)}{r} \\ \frac{1}{2}\,\frac{\left(\frac{\partial}{\partial r} u^*_{-2}(r, \phi)\right) r - u^*_{-2}(r, \phi) + \left(\frac{\partial}{\partial \phi} u^*_{-1}(r, \phi)\right)}{r}, & \frac{u^*_{-1}(r, \phi) + \left(\frac{\partial}{\partial \phi} u^*_{-2}(r, \phi)\right)}{r} \end{bmatrix}$$

Test orthogonality of Co- and Contravariant deformed base vectors=, $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$

$$CompactRpos_1(r, \phi) := r\cos(\phi) + U1\cos(\phi) - U2\, r\sin(\phi)$$

$$CompactRpos_2(r, \phi) := r\sin(\phi) + U1\sin(\phi) + U2\, r\cos(\phi)$$

Covariant deformed base vectors (in columns of matrix)=,

$$[\cos(\phi) + U11\cos(\phi) - U21\, r\sin(\phi) - U2\sin(\phi),$$

$$-r\sin(\phi) + U12\cos(\phi) - U1\sin(\phi) - U22\, r\sin(\phi) - U2\, r\cos(\phi)]$$

$$[\sin(\phi) + U11\sin(\phi) + U21\, r\cos(\phi) + U2\cos(\phi),$$

$$r\cos(\phi) + U12\sin(\phi) + U1\cos(\phi) + U22\, r\cos(\phi) - U2\, r\sin(\phi)]$$

Covariant deformed metric tensor=,

$$[U21^2\, r^2 + 2\, U21\, r\, U2 + U2^2 + 1 + 2\, U11 + U11^2,$$

$$U21\, r\, U1 + U21\, r^2\, U22 + U2\, U22\, r + U21\, r^2 + U2\, U1 + U12 - U11\, U2\, r + U11\, U12]$$

$$[U21\, r\, U1 + U21\, r^2\, U22 + U2\, U22\, r + U21\, r^2 + U2\, U1 + U12 - U11\, U2\, r + U11\, U12,$$

$$2\, U1\, U22\, r + r^2 + U2^2\, r^2 + U12^2 + U1^2 + 2\, r^2\, U22 + U22^2\, r^2 + 2\, r\, U1 - 2\, U12\, U2\, r]$$

Full nonlinear strain tensor=,

$$\Big[\frac{1}{2} U21^2\, r^2 + U21\, r\, U2 + \frac{1}{2} U2^2 + U11 + \frac{1}{2} U11^2, \frac{1}{2} U21\, r\, U1 + \frac{1}{2} U21\, r^2\, U22 + \frac{1}{2} U2\, U22\, r$$

$$+ \frac{1}{2} U21\, r^2 + \frac{1}{2} U2\, U1 + \frac{1}{2} U12 - \frac{1}{2} U11\, U2\, r + \frac{1}{2} U11\, U12\Big]$$

$$\Big[\frac{1}{2} U21\, r\, U1 + \frac{1}{2} U21\, r^2\, U22 + \frac{1}{2} U2\, U22\, r + \frac{1}{2} U21\, r^2 + \frac{1}{2} U2\, U1 + \frac{1}{2} U12 - \frac{1}{2} U11\, U2\, r$$

$$+ \frac{1}{2} U11\, U12, U1\, U22\, r + \frac{1}{2} U2^2\, r^2 + \frac{1}{2} U12^2 + \frac{1}{2} U1^2 + r^2\, U22 + \frac{1}{2} U22^2\, r^2 + r\, U1 - U12\, U2\, r$$

$$\Big]$$

$$\mathit{Linear\ strain\ tensor}=,\begin{bmatrix} U11 & \frac{1}{2}\,U21\,r^2+\frac{1}{2}\,U12 \\ \frac{1}{2}\,U21\,r^2+\frac{1}{2}\,U12 & r\,U1+r^2\,U22 \end{bmatrix}$$

$$\mathit{Linear\ strain\ tensor\ in\ phys.\ comp.}=,\begin{bmatrix} U{*}11 & \frac{1}{2}\,\frac{U{*}21\,r-U{*}2+U{*}12}{r} \\ \frac{1}{2}\,\frac{U{*}21\,r-U{*}2+U{*}12}{r} & \frac{U{*}1+U{*}22}{r} \end{bmatrix}$$

Contravariant deformed base vectors (in columns of matrix)=,

$$\left[\frac{r\cos(\phi)+U12\sin(\phi)+U1\cos(\phi)+U22\,r\cos(\phi)-U2\,r\sin(\phi)}{U11\,r+U11\,U1+r\,U11\,U22+r\,U2^2+r+U1+U22\,r-r\,U12\,U21+r^2\,U21\,U2-U12\,U2},\right.$$
$$\left.-\frac{\sin(\phi)+U11\sin(\phi)+U21\,r\cos(\phi)+U2\cos(\phi)}{U11\,r+U11\,U1+r\,U11\,U22+r\,U2^2+r+U1+U22\,r-r\,U12\,U21+r^2\,U21\,U2-U12\,U2}\right]$$

$$\left[\frac{r\sin(\phi)-U12\cos(\phi)+U1\sin(\phi)+U22\,r\sin(\phi)+U2\,r\cos(\phi)}{U11\,r+U11\,U1+r\,U11\,U22+r\,U2^2+r+U1+U22\,r-r\,U12\,U21+r^2\,U21\,U2-U12\,U2},\right.$$
$$\left.-\frac{U2\sin(\phi)+U21\,r\sin(\phi)-\cos(\phi)-U11\cos(\phi)}{U11\,r+U11\,U1+r\,U11\,U22+r\,U2^2+r+U1+U22\,r-r\,U12\,U21+r^2\,U21\,U2-U12\,U2}\right]$$

Deformed Christoffel symbols=, array(1 .. 2, 1 .. 2, -2 .. -1, [

$$(1,1,-2)=-\frac{-U211\,r-U211\,r\,U11-2\,U21-2\,U11\,U21+U111\,U2+U111\,U21\,r}{U11\,r+U11\,U1+r\,U11\,U22+r\,U2^2+r+U1+U22\,r-r\,U12\,U21+r^2\,U21\,U2-U12\,U2}$$

$$(1,1,-1)=\frac{U111\,r-2\,U12\,U21+U111\,U1-U211\,r\,U12+U211\,r^2\,U2+2\,U21\,r\,U2+U111\,U22\,r}{U11\,r+U11\,U1+r\,U11\,U22+r\,U2^2+r+U1+U22\,r-r\,U12\,U21+r^2\,U21\,U2-U12\,U2}$$

$$(1,2,-2)=(U2^2+U212\,r\,U11+2\,U21\,r\,U2+U11^2+2\,U11+U22-U112\,U21\,r$$
$$+U22\,U11-U112\,U2+U212\,r+1+U21^2\,r^2)\Big/($$
$$U11\,r+U11\,U1+r\,U11\,U22+r\,U2^2+r+U1+U22\,r-r\,U12\,U21+r^2\,U21\,U2-U12\,U2)$$

$$(1,2,-1)=(-U21\,r\,U1-U21\,r^2\,U22-U21\,r^2-U2\,U1-U11\,U12+U11\,U2\,r$$
$$-U212\,r\,U12+U212\,r^2\,U2+U112\,U22\,r-U12+U112\,U1+U112\,r-U22\,U12)\Big/($$

$$U11\,r+U11\,U1+r\,U11\,U22+r\,U2^2+r+U1+U22\,r-r\,U12\,U21+r^2\,U21\,U2-U12\,U2)$$

$$(2,1,-2)=(U2^2+U212\,r\,U11+2\,U21\,r\,U2+U11^2+2\,U11+U22-U112\,U21\,r$$
$$+U22\,U11-U112\,U2+U212\,r+1+U21^2\,r^2)\Big/($$
$$U11\,r+U11\,U1+r\,U11\,U22+r\,U2^2+r+U1+U22\,r-r\,U12\,U21+r^2\,U21\,U2-U12\,U2)$$

$$(2,1,-1)=(-U21\,r\,U1-U21\,r^2\,U22-U21\,r^2-U2\,U1-U11\,U12+U11\,U2\,r$$
$$-U212\,r\,U12+U212\,r^2\,U2+U112\,U22\,r-U12+U112\,U1+U112\,r-U22\,U12)\Big/($$
$$U11\,r+U11\,U1+r\,U11\,U22+r\,U2^2+r+U1+U22\,r-r\,U12\,U21+r^2\,U21\,U2-U12\,U2)$$

$$(2,2,-2)=(U21\,r\,U1+2\,U21\,r^2\,U22+2\,U2\,U22\,r+U21\,r^2+U2\,U1+2\,U11\,U12$$
$$-U11\,U2\,r+2\,U12+U222\,r\,U11+U222\,r-U122\,U2-U122\,U21\,r)\Big/($$
$$U11\,r+U11\,U1+r\,U11\,U22+r\,U2^2+r+U1+U22\,r-r\,U12\,U21+r^2\,U21\,U2-U12\,U2)$$

$$(2,2,-1)=-(3\,U1\,U22\,r-U122\,U22\,r+r^2+U2^2\,r^2+2\,U12^2+U1^2+3\,r^2\,U22+2\,U22^2\,r^2$$
$$+2\,r\,U1-3\,U12\,U2\,r-U122\,r-U122\,U1-U222\,r^2\,U2+U222\,r\,U12)\Big/($$
$$U11\,r+U11\,U1+r\,U11\,U22+r\,U2^2+r+U1+U22\,r-r\,U12\,U21+r^2\,U21\,U2-U12\,U2)$$

])

$$\mathit{CompactElast}_1:=\Bigg((U2^2+U212\,r\,U11+2\,U21\,r\,U2+U11^2+2\,U11+U22-U112\,U21\,r$$
$$+U22\,U11-U112\,U2+U212\,r+1+U21^2\,r^2)\Big/($$
$$U11\,r+U11\,U1+r\,U11\,U22+r\,U2^2+r+U1+U22\,r-r\,U12\,U21+r^2\,U21\,U2-U12\,U2)$$
$$+2$$
$$\frac{U111\,r-2\,U12\,U21+U111\,U1-U211\,r\,U12+U211\,r^2\,U2+2\,U21\,r\,U2+U111\,U22\,r}{U11\,r+U11\,U1+r\,U11\,U22+r\,U2^2+r+U1+U22\,r-r\,U12\,U21+r^2\,U21\,U2-U12\,U2}\Bigg)$$
$$\tau_{-1,-1}-((3\,U1\,U22\,r-U122\,U22\,r+r^2+U2^2\,r^2+2\,U12^2+U1^2+3\,r^2\,U22+2\,U22^2\,r^2$$
$$+2\,r\,U1-3\,U12\,U2\,r-U122\,r-U122\,U1-U222\,r^2\,U2+U222\,r\,U12)\,\tau_{-2,-2})\Big/($$
$$U11\,r+U11\,U1+r\,U11\,U22+r\,U2^2+r+U1+U22\,r-r\,U12\,U21+r^2\,U21\,U2-U12\,U2)$$
$$+(3\,(-U21\,r\,U1-U21\,r^2\,U22-U21\,r^2-U2\,U1-U11\,U12+U11\,U2\,r-U212\,r\,U12$$
$$+U212\,r^2\,U2+U112\,U22\,r-U12+U112\,U1+U112\,r-U22\,U12)\Big/($$
$$U11\,r+U11\,U1+r\,U11\,U22+r\,U2^2+r+U1+U22\,r-r\,U12\,U21+r^2\,U21\,U2-U12\,U2)$$
$$+(U21\,r\,U1+2\,U21\,r^2\,U22+2\,U2\,U22\,r+U21\,r^2+U2\,U1+2\,U11\,U12-U11\,U2\,r$$
$$+2\,U12+U222\,r\,U11+U222\,r-U122\,U2-U122\,U21\,r)\Big/($$
$$U11\,r+U11\,U1+r\,U11\,U22+r\,U2^2+r+U1+U22\,r-r\,U12\,U21+r^2\,U21\,U2-U12\,U2))$$
$$\tau_{-1,-2}+\left(\frac{\partial}{\partial r}\,\tau_{-1,-1}\right)+\rho\,b_{-1}+\left(\frac{\partial}{\partial \phi}\,\tau_{-1,-2}\right)$$

$$\mathit{CompactElast}_2:=$$

$$-\frac{(-U211\, r - U211\, r\, U11 - 2\, U21 - 2\, U11\, U21 + U111\, U2 + U111\, U21\, r)\, \tau_{-1,-1}}{U11\, r + U11\, U1 + r\, U11\, U22 + r\, U2^2 + r + U1 + U22\, r - r\, U12\, U21 + r^2\, U21\, U2 - U12\, U2}$$

$$+ ((-U21\, r\, U1 - U21\, r^2\, U22 - U21\, r^2 - U2\, U1 - U11\, U12 + U11\, U2\, r - U212\, r\, U12$$
$$+ U212\, r^2\, U2 + U112\, U22\, r - U12 + U112\, U1 + U112\, r - U22\, U12) \Big/ ($$
$$U11\, r + U11\, U1 + r\, U11\, U22 + r\, U2^2 + r + U1 + U22\, r - r\, U12\, U21 + r^2\, U21\, U2 - U12\, U2)$$
$$+ 2\, (U21\, r\, U1 + 2\, U21\, r^2\, U22 + 2\, U2\, U22\, r + U21\, r^2 + U2\, U1 + 2\, U11\, U12 - U11\, U2\, r$$
$$+ 2\, U12 + U222\, r\, U11 + U222\, r - U122\, U2 - U122\, U21\, r) \Big/ ($$
$$U11\, r + U11\, U1 + r\, U11\, U22 + r\, U2^2 + r + U1 + U22\, r - r\, U12\, U21 + r^2\, U21\, U2 - U12\, U2))$$

$$\tau_{-2,-2} + \Bigg($$
$$\frac{U111\, r - 2\, U12\, U21 + U111\, U1 - U211\, r\, U12 + U211\, r^2\, U2 + 2\, U21\, r\, U2 + U111\, U22\, r}{U11\, r + U11\, U1 + r\, U11\, U22 + r\, U2^2 + r + U1 + U22\, r - r\, U12\, U21 + r^2\, U21\, U2 - U12\, U2}$$
$$+ 3\, (U2^2 + U212\, r\, U11 + 2\, U21\, r\, U2 + U11^2 + 2\, U11 + U22 - U112\, U21\, r + U22\, U11$$
$$- U112\, U2 + U212\, r + 1 + U21^2\, r^2) \Big/ ($$
$$U11\, r + U11\, U1 + r\, U11\, U22 + r\, U2^2 + r + U1 + U22\, r - r\, U12\, U21 + r^2\, U21\, U2 - U12\, U2)\Bigg)$$

$$\tau_{-1,-2} + \left(\frac{\partial}{\partial r}\tau_{-1,-2}\right) + \left(\frac{\partial}{\partial \phi}\tau_{-2,-2}\right) + \rho\, b_{-2}$$

>