PhysRevD.62.044034 equation (20)

```
from shared import *
import cdblib

jsonfile = 'eqtn20.json'
cdblib.create (jsonfile)

dotGiBar = cdblib.get ('dotGiBar','eqtn19.json')
defMomSub = cdblib.get ('defMomSub','momentum.json')

# ------------------------------------------------------------------------
# DGiBarDt pt.2

substitute (dotGiBar, defMomSub)      # cdb(eq20.101,dotGiBar)
```

$$\partial_t \bar{\Gamma}^i = -2\bar{A}^{ia}\partial_a N - 2N\partial_a \bar{A}^{ia} \tag{eq19.106}$$

$$= -2\bar{A}^{ia}\partial_a N - 2N\left(-6\bar{A}^{ia}\partial_a \phi - \bar{A}^{ab}\bar{\Gamma}^i{}_{ab} + \frac{2}{3}\bar{g}^{ia}\partial_a \mathrm{tr}K\right) \tag{eq20.101}$$

```
# ----------------------------------------------------------------------------
# Check against prd62.

foo := @(dotGiBar).                                  # cdb (eq20.lcb,foo)
bah  = cdblib.get('prd62.eq20.rhs','prd62.json')     # cdb (eq20.prd,bah)

diff := @(foo) - @(bah).

distribute     (diff)
diff = product_sort (diff)
rename_dummies (diff)
map_sympy      (diff, "simplify")
canonicalise   (diff)                                # cdb (eq20.chk,diff)
```

$$\texttt{eq20.lcb} := -2\bar{A}^{ia}\partial_a N - 2N\left(-6\bar{A}^{ia}\partial_a\phi - \bar{A}^{ab}\bar{\Gamma}^{i}{}_{ab} + \frac{2}{3}\bar{g}^{ia}\partial_a \mathrm{tr}K\right)$$

$$\texttt{eq20.prd} := -2\bar{A}^{ij}\partial_j N + 2N\left(\bar{\Gamma}^{i}{}_{jk}\bar{A}^{kj} - \frac{2}{3}\bar{g}^{ij}\partial_j \mathrm{tr}K + 6\bar{A}^{ij}\partial_j\phi\right)$$

$$\texttt{eq20.chk} := 0$$