```
<< AceGen`
SMSInitialize["mls3dstrainssecond",
 "Language" → "Fortran90", "Mode" → "Optimal", "VectorLength" → 50 000]
SMSModule["mls3dstrainssecond", Real[mu$$, lambda$$, c2$$,
   c3$$, c5$$, c11$$, c15$$, nl$$[3], nl2$$[3, 3], f$$[3, 3], f2$$[3, 3, 3],
   green$$[3, 3], green2$$[3, 3, 3], s$$[3, 3], sigma$$[3, 3, 3], nucleus$$[3]]];
mu ⊨ SMSReal[mu$$];
lambda ⊨ SMSReal[lambda$$];
c2 ⊨ SMSReal[c2$$];
c3 ⊨ SMSReal[c3$$];
c5 ⊨ SMSReal[c5$$];
c11 ⊨ SMSReal[c11$$];
c15 ⊨ SMSReal[c15$$];
nl ⊨ SMSReal[Array[nl$$, {3}]];
nl2 ⊨ SMSReal[Array[nl2$$, {3, 3}]];
green ⊨ SMSReal[Array[green$$, {3, 3}]];
green2 ⊨ SMSReal[Array[green2$$, {3, 3, 3}]];
f ⊨ SMSReal[Array[f$$, {3, 3}]];
f2 ⊨ SMSReal[Array[f2$$, {3, 3, 3}]];
s ⊨ SMSReal[Array[s$$, {3, 3}]];
sigma ⊨ SMSReal[Array[sigma$$, {3, 3, 3}]];
nucleus ⊨ SMSReal[Array[nucleus$$, {3}]];
delta ⊨ {{1, 0, 0}, {0, 1, 0}, {0, 0, 1}};
(* Fourth order tensor *)
cc = Table[0, {i, 3}, {j, 3}, {k, 3}, {l, 3}];
Do[cc[[i, j, k, l]] = lambda * delta[[i, j]] * delta[[k, l]] +
    mu * (delta[[i, k]] * delta[[j, l]] + delta[[i, l]] * delta[[j, k]]), {i, 3}, {j, 3}, {k, 3}, {l, 3}];
Do[s[[i, j]] = 0, {i, 3}, {j, 3}];
Do[s[[i, j]] = s[[i, j]] + cc[[i, j, k, l]] * green[[k, l]], {i, 3}, {j, 3}, {k, 3}, {l, 3}];
(* Sixth order tensor *)
ctang = Table[0, {i, 3}, {j, 3}, {k, 3}, {l, 3}, {p, 3}, {q, 3}];
Do[ctang[[i, j, k, l, p, q]] = ctang[[i, j, k, l, p, q]] +
    c2 * (delta[[i, j]] * delta[[k, l]] * delta[[p, q]] + delta[[i, j]] * delta[[k, p]] * delta[[l, q]] +
       delta[[i, k]] * delta[[j, q]] * delta[[l, p]] + delta[[i, q]] * delta[[j, k]] * delta[[l, p]]) +
    c3 * delta[[i, j]] * delta[[k, q]] * delta[[l, p]] +
    c5 * (delta[[i, k]] * delta[[j, l]] * delta[[p, q]] + delta[[i, k]] * delta[[j, p]] * delta[[l, q]] +
       delta[[i, l]] * delta[[j, k]] * delta[[p, q]] + delta[[i, p]] * delta[[j, k]] * delta[[l, q]]) +
    c11 * (delta[[i, p]] * delta[[j, l]] * delta[[k, q]] + delta[[l, i]] * delta[[p, j]] * delta[[k, q]]) +
    c15 * (delta[[i, l]] * delta[[j, q]] * delta[[k, p]] + delta[[i, p]] * delta[[j, q]] * delta[[k, l]] +
       delta[[i, q]] * delta[[j, l]] * delta[[k, p]] + delta[[i, q]] * delta[[j, p]] * delta[[k, l]]),
  {i, 3}, {j, 3}, {k, 3}, {l, 3}, {p, 3}, {q, 3}];
Do[sigma[[i, j, k]] = 0, {i, 3}, {j, 3}, {k, 3}];
```

```
Do[sigma[[i, j, k]] = sigma[[i, j, k]] + ctang[[i, j, k, l, m, n]] * green2[[l, m, n]],
  {i, 3}, {j, 3}, {k, 3}, {l, 3}, {m, 3}, {n, 3}];
Do[nucleus[[m]] = 0, {m, 3}];
Do[nucleus[[m]] = nucleus[[m]] + (1 / 2) * s[[i, j]] * (nl[[i]] * f[[m, j]] + nl[[j]] * f[[m, i]]),
 {m, 3}, {i, 3}, {j, 3}]
Do[nucleus[[m]] = nucleus[[m]] + (1 / 2) * sigma[[i, j, n]] * (nl2[[i, n]] * f[[m, j]] + nl2[[j, n]] * f[[m, i]] +
      nl[[j]] * f2[[m, i, n]] + nl[[i]] * f2[[m, j, n]]), {m, 3}, {n, 3}, {i, 3}, {j, 3}]
SMSExport[s, s$$];
SMSExport[sigma, sigma$$];
SMSExport[nucleus, nucleus$$];
SMSWrite[];
```

Out[ ]=

True

File:	mls3dstrainssecond.f90	Size: 8453
Methods	No.Formulae	No.Leafs
mls3dstrainssecond	140	3894