```
> with(linalg);
```

[*BlockDiagonal*, *GramSchmidt*, *JordanBlock*, *LUdecomp*, *QRdecomp*, *Wronskian*, *addcol*, *addrow*, *adj*, *adjoint*, *angle*, *augment*, *backsub*, *band*, *basis*, *bezout*, *blockmatrix*, *charmat*, *charpoly*, *cholesky*, *col*, *coldim*, *colspace*, *colspan*, *companion*, *concat*, *cond*, *copyinto*, *crossprod*, *curl*, *definite*, *delcols*, *delrows*, *det*, *diag*, *diverge*, *dotprod*, *eigenvals*, *eigenvalues*, *eigenvectors*, *eigenvects*, *entermatrix*, *equal*, *exponential*, *extend*, *ffgausselim*, *fibonacci*, *forwardsub*, *frobenius*, *gausselim*, *gaussjord*, *geneqns*, *genmatrix*, *grad*, *hadamard*, *hermite*, *hessian*, *hilbert*, *htranspose*, *ihermite*, *indexfunc*, *innerprod*, *intbasis*, *inverse*, *ismith*, *issimilar*, *iszero*, *jacobian*, *jordan*, *kernel*, *laplacian*, *leastsqrs*, *linsolve*, *matadd*, *matrix*, *minor*, *minpoly*, *mulcol*, *mulrow*, *multiply*, *norm*, *normalize*, *nullspace*, *orthog*, *permanent*, *pivot*, *potential*, *randmatrix*, *randvector*, *rank*, *ratform*, *row*, *rowdim*, *rowspace*, *rowspan*, *rref*, *scalarmul*, *singularvals*, *smith*, *stackmatrix*, *submatrix*, *subvector*, *sumbasis*, *swapcol*, *swaprow*, *sylvester*, *toeplitz*, *trace*, *transpose*, *vandermonde*, *vecpotent*, *vectdim*, *vector*, *wronskian*]

```
> u:=T*(c3*R^3+c2*R^2+c1*R);
```

$$u := T\,(c3\,R^3 + c2\,R^2 + c1\,R)$$

```
> uv:=<u*cos(H),u*sin(H),0>;
```

$$uv := \begin{bmatrix} T\,(c3\,R^3 + c2\,R^2 + c1\,R)\cos(H) \\ T\,(c3\,R^3 + c2\,R^2 + c1\,R)\sin(H) \\ 0 \end{bmatrix}$$

```
> Gu:=evalm(matrix([[diff(uv[1],R)*cos(H)-diff(uv[1],H)*sin(H)/R,

  diff(uv[1],R)*sin(H)+diff(uv[1],H)*cos(H)/R,0],

  [diff(uv[2],R)*cos(H)-diff(uv[2],H)*sin(H)/R,

  diff(uv[2],R)*sin(H)+diff(uv[2],H)*cos(H)/R,0],
                     [0,0,0]]));
```

$Gu :=$

$$\left[T\,(3\,c3\,R^2 + 2\,c2\,R + c1)\cos(H)^2 + \frac{T\,(c3\,R^3 + c2\,R^2 + c1\,R)\sin(H)^2}{R},\right.$$
$$\left. T\,(3\,c3\,R^2 + 2\,c2\,R + c1)\cos(H)\sin(H) - \frac{T\,(c3\,R^3 + c2\,R^2 + c1\,R)\sin(H)\cos(H)}{R}, 0\right]$$
$$\left[T\,(3\,c3\,R^2 + 2\,c2\,R + c1)\cos(H)\sin(H) - \frac{T\,(c3\,R^3 + c2\,R^2 + c1\,R)\sin(H)\cos(H)}{R},\right.$$
$$\left. T\,(3\,c3\,R^2 + 2\,c2\,R + c1)\sin(H)^2 + \frac{T\,(c3\,R^3 + c2\,R^2 + c1\,R)\cos(H)^2}{R}, 0\right]$$
$$[0, 0, 0]$$

```
> I3:=matrix([[1,0,0],[0,1,0],[0,0,1]]);
```

$$I3 := \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

```
> F:=simplify(evalm(I3+Gu));
```

$F :=$

$$[1 + 2\,T \cos(H)^2\, c3\, R^2 + T \cos(H)^2\, c2\, R + T\, c3\, R^2 + T\, c2\, R + T\, c1\,,$$
$$T \cos(H) \sin(H)\, R\, (2\, c3\, R + c2)\,,\, 0]$$
$$[T \cos(H) \sin(H)\, R\, (2\, c3\, R + c2)\,,$$
$$1 + 3\,T\, c3\, R^2 - 2\,T \cos(H)^2\, c3\, R^2 + 2\,T\, c2\, R - T \cos(H)^2\, c2\, R + T\, c1\,,\, 0]$$
$$[0\,,0\,,1]$$

```
> P:=simplify(evalm(E/2*inverse(F)&*(F&*transpose(F)-I3)));
```

$P :=$

$$\left[\frac{1}{2} T\, E\, (6\,T^2 \cos(H)^2\, c3^3\, R^6 + 2\, c2\, R + 10\,T^2 \cos(H)^2\, c3\, R^3\, c2\, c1 + 2\,T^2 \cos(H)^2\, c3\, R^2\, c1^2\right.$$
$$+ 13\,T^2 \cos(H)^2\, c3^2\, R^5\, c2 + 8\,T^2 \cos(H)^2\, c3^2\, R^4\, c1 + 8\,T \cos(H)^2\, c3^2\, R^4 + 4\,T \cos(H)^2\, c3\, R^2\, c1$$
$$+ 2\,T \cos(H)^2\, c2\, R\, c1 + 3\,T \cos(H)^2\, c2^2\, R^2 + T^2 \cos(H)^2\, c2\, R\, c1^2 + 3\,T^2 \cos(H)^2\, c2^2\, R^2\, c1$$
$$+ 9\,T^2 \cos(H)^2\, c3\, R^4\, c2^2 + 2 \cos(H)^2\, c2\, R + 4 \cos(H)^2\, c3\, R^2 + 3\,T\, c1^2 + 2\, c3\, R^2$$
$$+ 2\,T^2 \cos(H)^2\, c2^3\, R^3 + 8\,T\, c2\, R\, c1 + 10\,T\, c1\, c3\, R^2 + 12\,T\, c3\, R^3\, c2 + 10\,T \cos(H)^2\, c3\, R^3\, c2$$
$$+ 7\,T^2\, c3^2\, R^4\, c1 + 8\,T^2\, c3^2\, R^5\, c2 + 5\,T^2\, c3\, R^2\, c1^2 + 5\,T^2\, c2^2\, R^2\, c1 + 4\,T^2\, c2\, R\, c1^2 + 2\, c1$$
$$+ 7\,T^2\, c3\, R^4\, c2^2 + T^2\, c1^3 + 12\,T^2\, c3\, R^3\, c2\, c1 + 7\,T\, c3^2\, R^4 + 5\,T\, c2^2\, R^2 + 2\,T^2\, c2^3\, R^3 + 3\,T^2\, c3^3\, R^6$$
$$)\Big/ (1 + 2\,T\, c1 + 3\,T^2\, c2\, R\, c1 + 5\,T^2\, c3\, R^3\, c2 + 3\,T\, c2\, R + 2\,T^2\, c2^2\, R^2 + 4\,T^2\, c1\, c3\, R^2 + 4\,T\, c3\, R^2$$
$$+ T^2\, c1^2 + 3\,T^2\, c3^2\, R^4)\,,\, \frac{1}{2} E\, T \cos(H) \sin(H)\, R\, (2\, c3\, R + c2)\, (2 + 3\,T\, c2\, R + 2\,T^2\, c2^2\, R^2$$
$$+ 4\,T\, c3\, R^2 + 3\,T^2\, c3^2\, R^4 + T^2\, c1^2 + 2\,T\, c1 + 3\,T^2\, c2\, R\, c1 + 5\,T^2\, c3\, R^3\, c2 + 4\,T^2\, c1\, c3\, R^2)\Big/ (1$$
$$+ 2\,T\, c1 + 3\,T^2\, c2\, R\, c1 + 5\,T^2\, c3\, R^3\, c2 + 3\,T\, c2\, R + 2\,T^2\, c2^2\, R^2 + 4\,T^2\, c1\, c3\, R^2 + 4\,T\, c3\, R^2$$
$$\left. + T^2\, c1^2 + 3\,T^2\, c3^2\, R^4)\,,\, 0\right]$$

$$\left[\frac{1}{2} E\, T \cos(H) \sin(H)\, R\, (2\, c3\, R + c2)\, (2 + 3\,T\, c2\, R + 2\,T^2\, c2^2\, R^2 + 4\,T\, c3\, R^2 + 3\,T^2\, c3^2\, R^4\right.$$
$$+ T^2\, c1^2 + 2\,T\, c1 + 3\,T^2\, c2\, R\, c1 + 5\,T^2\, c3\, R^3\, c2 + 4\,T^2\, c1\, c3\, R^2)\Big/ (1 + 2\,T\, c1 + 3\,T^2\, c2\, R\, c1$$
$$+ 5\,T^2\, c3\, R^3\, c2 + 3\,T\, c2\, R + 2\,T^2\, c2^2\, R^2 + 4\,T^2\, c1\, c3\, R^2 + 4\,T\, c3\, R^2 + T^2\, c1^2 + 3\,T^2\, c3^2\, R^4)\,,\, -\frac{1}{2} E$$
$$T\, (6\,T^2 \cos(H)^2\, c3^3\, R^6 - 4\, c2\, R + 10\,T^2 \cos(H)^2\, c3\, R^3\, c2\, c1 + 2\,T^2 \cos(H)^2\, c3\, R^2\, c1^2$$
$$+ 13\,T^2 \cos(H)^2\, c3^2\, R^5\, c2 + 8\,T^2 \cos(H)^2\, c3^2\, R^4\, c1 + 8\,T \cos(H)^2\, c3^2\, R^4 + 4\,T \cos(H)^2\, c3\, R^2\, c1$$

$+ 2\,T\cos(H)^2\,c2\,R\,c1 + 3\,T\cos(H)^2\,c2^2\,R^2 + T^2\cos(H)^2\,c2\,R\,c1^2 + 3\,T^2\cos(H)^2\,c2^2\,R^2\,c1$
$+ 9\,T^2\cos(H)^2\,c3\,R^4\,c2^2 + 2\cos(H)^2\,c2\,R + 4\cos(H)^2\,c3\,R^2 - 3\,T\,c1^2 - 6\,c3\,R^2$
$+ 2\,T^2\cos(H)^2\,c2^3\,R^3 - 10\,T\,c2\,R\,c1 - 14\,T\,c1\,c3\,R^2 - 22\,T\,c3\,R^3\,c2 + 10\,T\cos(H)^2\,c3\,R^3\,c2$
$- 15\,T^2\,c3^2\,R^4\,c1 - 21\,T^2\,c3^2\,R^5\,c2 - 7\,T^2\,c3\,R^2\,c1^2 - 8\,T^2\,c2^2\,R^2\,c1 - 5\,T^2\,c2\,R\,c1^2 - 2\,c1$
$- 16\,T^2\,c3\,R^4\,c2^2 - T^2\,c1^3 - 22\,T^2\,c3\,R^3\,c2\,c1 - 15\,T\,c3^2\,R^4 - 8\,T\,c2^2\,R^2 - 4\,T^2\,c2^3\,R^3$
$- 9\,T^2\,c3^3\,R^6)\Big/(1 + 2\,T\,c1 + 3\,T^2\,c2\,R\,c1 + 5\,T^2\,c3\,R^3\,c2 + 3\,T\,c2\,R + 2\,T^2\,c2^2\,R^2$
$+ 4\,T^2\,c1\,c3\,R^2 + 4\,T\,c3\,R^2 + T^2\,c1^2 + 3\,T^2\,c3^2\,R^4), 0\Big]$

$[0, 0, 0]$

```
> Q:=matrix([[ cos(H),sin(H),0],
             [-sin(H),cos(H),0],
             [0,0,1]]);
```

$$Q := \begin{bmatrix} \cos(H) & \sin(H) & 0 \\ -\sin(H) & \cos(H) & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

```
> PQ:=simplify(evalm(Q&*P&*transpose(Q)));
```

$PQ :=$

$\Big[\frac{1}{2}(9\,T\,c3^2\,R^4 + 12\,T\,c3\,R^3\,c2 + 6\,T\,c1\,c3\,R^2 + 4\,T\,c2^2\,R^2 + 6\,c3\,R^2 + 4\,T\,c2\,R\,c1 + 4\,c2\,R$
$+ T\,c1^2 + 2\,c1)\,T\,E\Big/(T\,c1 + 1 + 2\,T\,c2\,R + 3\,T\,c3\,R^2), 0, 0\Big]$

$\Big[0, \frac{1}{2}$
$(T\,c3^2\,R^4 + 2\,T\,c3\,R^3\,c2 + 2\,T\,c1\,c3\,R^2 + T\,c2^2\,R^2 + 2\,c3\,R^2 + 2\,T\,c2\,R\,c1 + 2\,c2\,R + T\,c1^2 + 2\,c1)$
$T\,E\Big/(T\,c3\,R^2 + T\,c2\,R + T\,c1 + 1), 0\Big]$

$[0, 0, 0]$

```
> Pb:=unapply(PQ[1,1],R);
```

$Pb := R \rightarrow \frac{1}{2}(9\,T\,c3^2\,R^4 + 12\,T\,c3\,R^3\,c2 + 6\,T\,c1\,c3\,R^2 + 4\,T\,c2^2\,R^2 + 6\,c3\,R^2 + 4\,T\,c2\,R\,c1$
$+ 4\,c2\,R + T\,c1^2 + 2\,c1)\,T\,E\Big/(T\,c1 + 1 + 2\,T\,c2\,R + 3\,T\,c3\,R^2)$

```
> ub:=unapply(u,R);
```

$$ub := R \rightarrow T\,(c3\,R^3 + c2\,R^2 + c1\,R)$$

```
> assume(Ri>0);
> assume(Ro>Ri);
> interface(showassumed=2);
```

```
> solve({Pb(Ro)=0,Pb(Ri)=0,ub(Ro)=T},{c1,c2,c3});
```

$$\left\{ c3 = -2\,\frac{1}{Ro^2\,(Ro-3\,Ri)},\ c2 = 3\,\frac{Ro+Ri}{Ro^2\,(Ro-3\,Ri)},\ c1 = -6\,\frac{Ri}{(Ro-3\,Ri)\,Ro} \right\},\ \{$$

$$c3 = -2\,\frac{-T\,Ri+Ro^2+T\,Ro}{T\,Ro^2\,(3\,Ri^2-4\,Ri\,Ro+Ro^2)},\ c1 = -2\,\frac{3\,T\,Ri\,Ro+Ro^3-3\,T\,Ri^2}{T\,Ro\,(3\,Ri^2-4\,Ri\,Ro+Ro^2)},$$

$$c2 = \frac{4\,Ro^3+3\,T\,Ro^2-3\,T\,Ri^2}{T\,Ro^2\,(3\,Ri^2-4\,Ri\,Ro+Ro^2)}\},\ \{$$

$$c3 = -2\,\frac{2\,Ro+T}{T\,Ro^2\,(Ro-3\,Ri)},\ c2 = 3\,\frac{2\,Ro^2+T\,Ro+2\,Ri\,Ro+T\,Ri}{T\,Ro^2\,(Ro-3\,Ri)},\ c1 = -2\,\frac{Ro^2+3\,Ri\,Ro+3\,T\,Ri}{T\,Ro\,(Ro-3\,Ri)}$$

$$\},\ \{c2 = \frac{2\,Ro^3+3\,T\,Ro^2-6\,Ri^2\,Ro-3\,T\,Ri^2}{T\,Ro^2\,(3\,Ri^2-4\,Ri\,Ro+Ro^2)},\ c1 = -2\,\frac{Ri\,(2\,Ro^2+3\,T\,Ro-3\,Ri\,Ro-3\,T\,Ri)}{T\,(3\,Ri^2-4\,Ri\,Ro+Ro^2)\,Ro},$$

$$c3 = -2\,\frac{Ro^2+T\,Ro-2\,Ri\,Ro-T\,Ri}{T\,Ro^2\,(3\,Ri^2-4\,Ri\,Ro+Ro^2)}\}$$

with assumptions on Ro and Ri

```
> dP:=simplify(<diff(P[1,1],R)*cos(H)-diff(P[1,1],H)*sin(H)/R
                +diff(P[2,1],R)*sin(H)+diff(P[2,1],H)*cos(H)/R,
                 diff(P[1,2],R)*cos(H)-diff(P[1,2],H)*sin(H)/R
                +diff(P[2,2],R)*sin(H)+diff(P[2,2],H)*cos(H)/R,
                 0>);
```

$dP :=$

$$\left[\frac{1}{2}\cos(H)\,T\,E\,(12\,T\,c2\,c1+19\,T\,c2^2\,R+72\,T^3\,c3^4\,R^7+24\,T^2\,c2^3\,R^2+9\,T^2\,c2\,c1^2+68\,T\,c3^2\,R^3 +3\,T^3\,c2\,c1^3+12\,T^3\,c2^4\,R^3+120\,c3^3\,R^5\,T^2+16\,c3\,R+6\,c2+32\,T\,c3\,R\,c1+112\,c3^2\,R^3\,T^2\,c1 +24\,c3\,R\,T^2\,c1^2+76\,T\,c3\,R^2\,c2+30\,T^2\,c2^2\,R\,c1+221\,T^2\,c3^2\,R^4\,c2+130\,T^2\,c3\,R^3\,c2^2 +56\,T^3\,c3^2\,R^3\,c1^2+8\,T^3\,c3\,R\,c1^3+120\,T^3\,c3^3\,R^5\,c1+191\,T^3\,c3^2\,R^5\,c2^2+195\,T^3\,c3^3\,R^6\,c2 +80\,T^3\,c3\,R^4\,c2^3+15\,T^3\,c2^2\,c1^2\,R+24\,T^3\,c2^3\,c1\,R^2+122\,T^2\,c3\,R^2\,c2\,c1+61\,T^3\,c3\,R^2\,c1^2\,c2 +221\,T^3\,c3^2\,R^4\,c1\,c2+130\,T^3\,c3\,R^3\,c1\,c2^2)\Big/((T\,c1+1+2\,T\,c2\,R+3\,T\,c3\,R^2)\,(1+2\,T\,c1 +3\,T^2\,c2\,R\,c1+5\,T^2\,c3\,R^3\,c2+3\,T\,c2\,R+2\,T^2\,c2^2\,R^2+4\,T^2\,c1\,c3\,R^2+4\,T\,c3\,R^2+T^2\,c1^2 +3\,T^2\,c3^2\,R^4))\right]$$

$$\left[\frac{1}{2}(12\,T\,c2\,c1+19\,T\,c2^2\,R+72\,T^3\,c3^4\,R^7+24\,T^2\,c2^3\,R^2+9\,T^2\,c2\,c1^2+68\,T\,c3^2\,R^3 +3\,T^3\,c2\,c1^3+12\,T^3\,c2^4\,R^3+120\,c3^3\,R^5\,T^2+16\,c3\,R+6\,c2+32\,T\,c3\,R\,c1+112\,c3^2\,R^3\,T^2\,c1 +24\,c3\,R\,T^2\,c1^2+76\,T\,c3\,R^2\,c2+30\,T^2\,c2^2\,R\,c1+221\,T^2\,c3^2\,R^4\,c2+130\,T^2\,c3\,R^3\,c2^2 +56\,T^3\,c3^2\,R^3\,c1^2+8\,T^3\,c3\,R\,c1^3+120\,T^3\,c3^3\,R^5\,c1+191\,T^3\,c3^2\,R^5\,c2^2+195\,T^3\,c3^3\,R^6\,c2\right.$$

$+ 80\, T^3\, c3\, R^4\, c2^3 + 15\, T^3\, c2^2\, c1^2\, R + 24\, T^3\, c2^3\, c1\, R^2 + 122\, T^2\, c3\, R^2\, c2\, c1 + 61\, T^3\, c3\, R^2\, c1^2\, c2$
$+ 221\, T^3\, c3^2\, R^4\, c1\, c2 + 130\, T^3\, c3\, R^3\, c1\, c2^2)\, E\, T \sin(H) \Big/ ((T\, c1 + 1 + 2\, T\, c2\, R + 3\, T\, c3\, R^2)\, (1$
$+ 2\, T\, c1 + 3\, T^2\, c2\, R\, c1 + 5\, T^2\, c3\, R^3\, c2 + 3\, T\, c2\, R + 2\, T^2\, c2^2\, R^2 + 4\, T^2\, c1\, c3\, R^2 + 4\, T\, c3\, R^2$
$+ T^2\, c1^2 + 3\, T^2\, c3^2\, R^4))\Big]$

$[0]$

```
> b:=evalm(-pi^2*E/rho*uv-1/rho*dP);
```

$b := \Big[-\frac{\pi^2\, E\, T\, (c3\, R^3 + c2\, R^2 + c1\, R) \cos(H)}{\rho} - \frac{1}{2} \cos(H)\, T\, E\, (12\, T\, c2\, c1 + 19\, T\, c2^2\, R$
$+ 72\, T^3\, c3^4\, R^7 + 24\, T^2\, c2^3\, R^2 + 9\, T^2\, c2\, c1^2 + 68\, T\, c3^2\, R^3 + 3\, T^3\, c2\, c1^3 + 12\, T^3\, c2^4\, R^3$
$+ 120\, c3^3\, R^5\, T^2 + 16\, c3\, R + 6\, c2 + 32\, T\, c3\, R\, c1 + 112\, c3^2\, R^3\, T^2\, c1 + 24\, c3\, R\, T^2\, c1^2$
$+ 76\, T\, c3\, R^2\, c2 + 30\, T^2\, c2^2\, R\, c1 + 221\, T^2\, c3^2\, R^4\, c2 + 130\, T^2\, c3\, R^3\, c2^2 + 56\, T^3\, c3^2\, R^3\, c1^2$
$+ 8\, T^3\, c3\, R\, c1^3 + 120\, T^3\, c3^3\, R^5\, c1 + 191\, T^3\, c3^2\, R^5\, c2^2 + 195\, T^3\, c3^3\, R^6\, c2 + 80\, T^3\, c3\, R^4\, c2^3$
$+ 15\, T^3\, c2^2\, c1^2\, R + 24\, T^3\, c2^3\, c1\, R^2 + 122\, T^2\, c3\, R^2\, c2\, c1 + 61\, T^3\, c3\, R^2\, c1^2\, c2$
$+ 221\, T^3\, c3^2\, R^4\, c1\, c2 + 130\, T^3\, c3\, R^3\, c1\, c2^2) \Big/ (\rho\, (T\, c1 + 1 + 2\, T\, c2\, R + 3\, T\, c3\, R^2)\, (1 + 2\, T\, c1$
$+ 3\, T^2\, c2\, R\, c1 + 5\, T^2\, c3\, R^3\, c2 + 3\, T\, c2\, R + 2\, T^2\, c2^2\, R^2 + 4\, T^2\, c1\, c3\, R^2 + 4\, T\, c3\, R^2 + T^2\, c1^2$
$+ 3\, T^2\, c3^2\, R^4)), -\frac{\pi^2\, E\, T\, (c3\, R^3 + c2\, R^2 + c1\, R) \sin(H)}{\rho} - \frac{1}{2} (12\, T\, c2\, c1 + 19\, T\, c2^2\, R$
$+ 72\, T^3\, c3^4\, R^7 + 24\, T^2\, c2^3\, R^2 + 9\, T^2\, c2\, c1^2 + 68\, T\, c3^2\, R^3 + 3\, T^3\, c2\, c1^3 + 12\, T^3\, c2^4\, R^3$
$+ 120\, c3^3\, R^5\, T^2 + 16\, c3\, R + 6\, c2 + 32\, T\, c3\, R\, c1 + 112\, c3^2\, R^3\, T^2\, c1 + 24\, c3\, R\, T^2\, c1^2$
$+ 76\, T\, c3\, R^2\, c2 + 30\, T^2\, c2^2\, R\, c1 + 221\, T^2\, c3^2\, R^4\, c2 + 130\, T^2\, c3\, R^3\, c2^2 + 56\, T^3\, c3^2\, R^3\, c1^2$
$+ 8\, T^3\, c3\, R\, c1^3 + 120\, T^3\, c3^3\, R^5\, c1 + 191\, T^3\, c3^2\, R^5\, c2^2 + 195\, T^3\, c3^3\, R^6\, c2 + 80\, T^3\, c3\, R^4\, c2^3$
$+ 15\, T^3\, c2^2\, c1^2\, R + 24\, T^3\, c2^3\, c1\, R^2 + 122\, T^2\, c3\, R^2\, c2\, c1 + 61\, T^3\, c3\, R^2\, c1^2\, c2$
$+ 221\, T^3\, c3^2\, R^4\, c1\, c2 + 130\, T^3\, c3\, R^3\, c1\, c2^2)\, E\, T \sin(H) \Big/ (\rho\, (T\, c1 + 1 + 2\, T\, c2\, R + 3\, T\, c3\, R^2)\, ($
$1 + 2\, T\, c1 + 3\, T^2\, c2\, R\, c1 + 5\, T^2\, c3\, R^3\, c2 + 3\, T\, c2\, R + 2\, T^2\, c2^2\, R^2 + 4\, T^2\, c1\, c3\, R^2 + 4\, T\, c3\, R^2$
$+ T^2\, c1^2 + 3\, T^2\, c3^2\, R^4)), 0\Big]$

```
> with(codegen,C);
```

$[C]$

```
> C(b,optimized,mode=double);
      t1 = pi*pi;
      t3 = 1/rho;
      t4 = t1*E*t3;
      t5 = R*R;
      t6 = t5*R;
      t8 = c2*t5;
      t9 = c1*R;
```

```
      t11 = T*(c3*t6+t8+t9);
      t12 = cos(H);
      t18 = c2*c2;
      t22 = T*c2;
      t25 = c3*R;
      t27 = T*T;
      t28 = t27*T;
      t29 = t28*c3;
      t34 = c3*c3;
      t35 = t28*t34;
      t36 = t5*t5;
      t41 = c1*c1;
      t46 = t27*c3;
      t50 = t18*c2;
      t54 = t34*t34;
      t59 = t27*c2;
      t62 = t34*c3;
      t63 = t36*R;
      t67 = t18*t18;
      t72 = t41*c1;
      t78 = 6.0*c2+19.0*T*t18*R+12.0*t22*c1+16.0*t25+130.0*t29*t6*c1*t18+221.0*
t35*t36*c1*c2+61.0*t29*t5*t41*c2+122.0*t46*t8*c1+24.0*t27*t50*t5+72.0*t28*t54*
t36*t6+9.0*t59*t41+120.0*t62*t63*t27+12.0*t28*t67*t6+3.0*t28*c2*t72+68.0*T*t34*
t6;
      t79 = t27*t41;
      t83 = t27*c1;
      t86 = T*c3;
      t89 = t27*t18;
      t94 = t27*t34;
      t101 = t28*t62;
      t129 = 24.0*t25*t79+112.0*t34*t6*t83+32.0*t86*t9+30.0*t89*t9+76.0*t86*t8+
221.0*t94*t36*c2+191.0*t35*t63*t18+120.0*t101*t63*c1+8.0*t29*R*t72+56.0*t35*t6*
t41+130.0*t46*t6*t18+15.0*t28*t18*t41*R+80.0*t29*t36*t50+195.0*t101*t36*t5*c2+
24.0*t28*t50*c1*t5;
      t130 = t78+t129;
      t132 = T*c1;
      t133 = t22*R;
      t135 = t86*t5;
      t156 = 1/(t132+1.0+2.0*t133+3.0*t135)/(1.0+2.0*t132+3.0*t59*t9+5.0*t46*t6
*c2+3.0*t133+2.0*t89*t5+4.0*t83*c3*t5+4.0*t135+t79+3.0*t94*t36);
      t161 = sin(H);
      b[0] = -t4*t11*t12-t3*t12*T*E*t130*t156/2.0;
      b[1] = -t4*t11*t161-t3*t130*E*T*t161*t156/2.0;
      b[2] = 0.0;
>
>
>
>
```