(%i1)
```
/* define special summation function */
f(i,j) := sum(R[i,j,sigma,0]*gContr[i,sigma]*gContr[j,0],sigma,0,3)
        + sum(R[i,j,sigma,1]*gContr[i,sigma]*gContr[j,1],sigma,0,3)
        + sum(R[i,j,sigma,2]*gContr[i,sigma]*gContr[j,2],sigma,0,3)
        + sum(R[i,j,sigma,3]*gContr[i,sigma]*gContr[j,3],sigma,0,3);
```
(%o1) $$f(i,j) := sum(R_{i,j,\sigma,0}\, gContr_{i,\sigma}\, gContr_{j,0}, \sigma, 0, 3) + sum(R_{i,j,\sigma,1}\, gContr_{i,\sigma}\, gContr_{j,1}, \sigma, 0, 3) + sum(R_{i,j,\sigma,2}\, gContr_{i,\sigma}\, gContr_{j,2}, \sigma, 0, 3) + sum(R_{i,j,\sigma,3}\, gContr_{i,\sigma}\, gContr_{j,3}, \sigma, 0, 3)$$

(%i2)
```
/* define coordinate vector */
array(x, 3);
[x[0],x[1],x[2],x[3]]: [t, r, theta, phi];
```
(%o2) x

(%o3) $[\,t, r, \theta, \varphi\,]$

(%i4)
```
C(r) := ((abs(r-r0))^n + alpha^n)^(2/n);
```
(%o4) $$C(r) := \left(\left|r - r0\right|^n + \alpha^n\right)^{2/n}$$

(%i5)
```
/* g1 is symm. metric with indices 1...4 */
g1: matrix(
 [-A*C(r)^(1/2),0,0,0],
 [0,B*C(r)^(1/2),0,0],
 [0,0,C(r),0],
 [0,0,0,C(r)*sin(theta)^2]
);
```
(%o5)
$$\begin{bmatrix} -\sqrt{\left(\left|r0 - r\right|^n + \alpha^n\right)^{2/n}}\, A & 0 & 0 & 0 \\ 0 & \sqrt{\left(\left|r0 - r\right|^n + \alpha^n\right)^{2/n}}\, B & 0 & 0 \\ 0 & 0 & \left(\left|r0 - r\right|^n + \alpha^n\right)^{2/n} & 0 \\ 0 & 0 & 0 & \left(\left|r0 - r\right|^n + \alpha^n\right)^{2/n} \sin(\theta)^2 \end{bmatrix}$$

(%i6)
```
/* contravariant g is inverse of g */
gContr1: ratsimp(invert(g1));
```

(%o6)
$$\begin{bmatrix} -\frac{\sqrt{\left(\left|r0-r\right|^n+\alpha^n\right)^{2/n}}}{\left(\left|r0-r\right|^n+\alpha^n\right)^{2/n}\,A} & 0 & 0 & 0 \\ 0 & \frac{\sqrt{\left(\left|r0-r\right|^n+\alpha^n\right)^{2/n}}}{\left(\left|r0-r\right|^n+\alpha^n\right)^{2/n}\,B} & 0 & 0 \\ 0 & 0 & \frac{1}{\left(\left|r0-r\right|^n+\alpha^n\right)^{2/n}} & 0 \\ 0 & 0 & 0 & \frac{1}{\left(\left|r0-r\right|^n+\alpha^n\right)^{2/n}\,\sin(\theta)^2} \end{bmatrix}$$

(%i7)
```
/* g1 and gContr1 are transformed to g and gContr (indices 0...3) */
for mu:0 thru 3 do {
for nu:0 thru 3 do {
    g     [mu,nu]: g1     [mu+1, nu+1],
    gContr[mu,nu]: gContr1[mu+1, nu+1]
}}$
```

(%i8)
```
/* computation of Christoffel symbols Gamma^sigma_mu_nu */
for sigma:0 thru 3 do {
for mu:0 thru 3 do {
for nu:0 thru 3 do {
    Gamma[sigma,mu,nu] :
    /* rho sum by function call: */
    sum(
        1/2 * gContr[sigma,rho]*(
        diff(g[nu,rho],x[mu] ) +
        diff(g[rho,mu],x[nu] ) -
        diff(g[mu,nu] ,x[rho])),
    rho, 0, 3),
    /* evaluate differentiation dy/dr */
    Gamma[sigma,mu,nu]: ev(Gamma[sigma,mu,nu],diff)
}}}$
```

(%i9)
```
/* dislplay Gamma's being different from zero */
for i:0 thru 3 do {
for j:0 thru 3 do {
for k:0 thru 3 do {
    if Gamma[i,j,k] # 0 then {
        display(Gamma[i,j,k])
}}}}$
```

$$\Gamma_{0,0,1} = -\frac{\left|r0-r\right|^n}{2\,(r0-r)\left(\left|r0-r\right|^n+\alpha^n\right)}$$

$$\Gamma_{0,1,0} = -\frac{\left|r0 - r\right|^n}{2\,(r0 - r)\left(\left|r0 - r\right|^n + \alpha^n\right)}$$

$$\Gamma_{1,0,0} = -\frac{\left|r0 - r\right|^n A}{2\,(r0 - r)\left(\left|r0 - r\right|^n + \alpha^n\right) B}$$

$$\Gamma_{1,1,1} = -\frac{\left|r0 - r\right|^n}{2\,(r0 - r)\left(\left|r0 - r\right|^n + \alpha^n\right)}$$

$$\Gamma_{1,2,2} = \frac{\left|r0 - r\right|^n \sqrt{\left(\left|r0 - r\right|^n + \alpha^n\right)^{2/n}}}{(r0 - r)\left(\left|r0 - r\right|^n + \alpha^n\right) B}$$

$$\Gamma_{1,3,3} = \frac{\left|r0 - r\right|^n \sqrt{\left(\left|r0 - r\right|^n + \alpha^n\right)^{2/n}}\, \sin(\theta)^2}{(r0 - r)\left(\left|r0 - r\right|^n + \alpha^n\right) B}$$

$$\Gamma_{2,1,2} = -\frac{\left|r0 - r\right|^n}{(r0 - r)\left(\left|r0 - r\right|^n + \alpha^n\right)}$$

$$\Gamma_{2,2,1} = -\frac{\left|r0 - r\right|^n}{(r0 - r)\left(\left|r0 - r\right|^n + \alpha^n\right)}$$

$$\Gamma_{2,3,3} = -\cos(\theta)\sin(\theta)$$

$$\Gamma_{3,1,3} = -\frac{\left|r0 - r\right|^n}{(r0 - r)\left(\left|r0 - r\right|^n + \alpha^n\right)}$$

$$\Gamma_{3,2,3} = \frac{\cos(\theta)}{\sin(\theta)}$$

$$\Gamma_{3,3,1} = -\frac{\left|r0 - r\right|^n}{(r0 - r)\left(\left|r0 - r\right|^n + \alpha^n\right)}$$

$$\Gamma_{3,3,2} = \frac{\cos(\theta)}{\sin(\theta)}$$

```
(%i10)  /* compute Riemann tensor elements */
        for rho:0 thru 3 do {
        for sigma:0 thru 3 do {
        for mu:0 thru 3 do {
        for nu:0 thru 3 do {
            R[rho,sigma,mu,nu] :
            diff(Gamma[rho,nu,sigma],x[mu]) -
            diff(Gamma[rho,mu,sigma],x[nu]) +
            /* lambda sums by function call: */
            sum(
                Gamma[rho,mu,lambda] * Gamma[lambda,nu,sigma] -
                Gamma[rho,nu,lambda] * Gamma[lambda,mu,sigma],
                lambda, 0, 3)
        }}}}$
```

```
(%i11)  /* dislplay R's being different from zero */
        for i:0 thru 3 do {
        for j:0 thru 3 do {
        for k:0 thru 3 do {
        for l:0 thru 3 do {
            R[i,j,k,l] : /*ratsimp*/(factor(R[i,j,k,l])),
            if R[i,j,k,l] # 0 then display(R[i,j,k,l])
            }}}}$
```

$$R_{0,1,0,1} = \frac{\left|r0 - r\right|^{n}\left(\left|r0 - r\right|^{n} - \alpha^{n} n + \alpha^{n}\right)}{2\left(r0 - r\right)^{2}\left(\left|r0 - r\right|^{n} + \alpha^{n}\right)^{2}}$$

$$R_{0,1,1,0} = -\frac{\left|r0 - r\right|^{n}\left(\left|r0 - r\right|^{n} - \alpha^{n} n + \alpha^{n}\right)}{2\left(r0 - r\right)^{2}\left(\left|r0 - r\right|^{n} + \alpha^{n}\right)^{2}}$$

$$R_{0,2,0,2} = -\frac{\left|r0 - r\right|^{2\,n}\sqrt{\left(\left|r0 - r\right|^{n} + \alpha^{n}\right)^{2/n}}}{2\left(r0 - r\right)^{2}\left(\left|r0 - r\right|^{n} + \alpha^{n}\right)^{2} B}$$

$$R_{0,2,2,0} = \frac{\left|r0 - r\right|^{2\,n}\sqrt{\left(\left|r0 - r\right|^{n} + \alpha^{n}\right)^{2/n}}}{2\left(r0 - r\right)^{2}\left(\left|r0 - r\right|^{n} + \alpha^{n}\right)^{2} B}$$

$$R_{0,3,0,3} = -\frac{\left|r0 - r\right|^{2\,n}\sqrt{\left(\left|r0 - r\right|^{n} + \alpha^{n}\right)^{2/n}}\,\sin(\theta)^{2}}{2\left(r0 - r\right)^{2}\left(\left|r0 - r\right|^{n} + \alpha^{n}\right)^{2} B}$$

$$R_{0,3,3,0} = \frac{\left|r0 - r\right|^{2\,n}\sqrt{\left(\left|r0 - r\right|^{n} + \alpha^{n}\right)^{2/n}}\,\sin(\theta)^{2}}{2\left(r0 - r\right)^{2}\left(\left|r0 - r\right|^{n} + \alpha^{n}\right)^{2} B}$$

$$R_{1,0,0,1} = \frac{\left|r0 - r\right|^{n}\left(\left|r0 - r\right|^{n} - \alpha^{n} n + \alpha^{n}\right) A}{2\left(r0 - r\right)^{2}\left(\left|r0 - r\right|^{n} + \alpha^{n}\right)^{2} B}$$

$$R_{1,0,1,0} = -\frac{\left|r0 - r\right|^{n}\left(\left|r0 - r\right|^{n} - \alpha^{n} n + \alpha^{n}\right) A}{2\left(r0 - r\right)^{2}\left(\left|r0 - r\right|^{n} + \alpha^{n}\right)^{2} B}$$

$$R_{1,2,1,2} = \frac{\left|r0 - r\right|^{n}\left(\left|r0 - r\right|^{n} + \alpha^{n}\right)^{2/n-2}\left(\left|r0 - r\right|^{n} - 2\,\alpha^{n} n + 2\,\alpha^{n}\right)}{2\left(r0 - r\right)^{2}\sqrt{\left(\left|r0 - r\right|^{n} + \alpha^{n}\right)^{2/n}} B}$$

$$R_{1,2,2,1} = -\frac{\left|r0 - r\right|^{n}\left(\left|r0 - r\right|^{n} + \alpha^{n}\right)^{2/n-2}\left(\left|r0 - r\right|^{n} - 2\,\alpha^{n} n + 2\,\alpha^{n}\right)}{2\left(r0 - r\right)^{2}\sqrt{\left(\left|r0 - r\right|^{n} + \alpha^{n}\right)^{2/n}} B}$$

$$R_{1,3,1,3} = \frac{\left|r0 - r\right|^{n}\left(\left|r0 - r\right|^{n} + \alpha^{n}\right)^{2/n-2}\left(\left|r0 - r\right|^{n} - 2\,\alpha^{n} n + 2\,\alpha^{n}\right)\sin(\theta)^{2}}{2\left(r0 - r\right)^{2}\sqrt{\left(\left|r0 - r\right|^{n} + \alpha^{n}\right)^{2/n}} B}$$

$$R_{1,3,3,1} = -\frac{\left|r0 - r\right|^{n}\left(\left|r0 - r\right|^{n} + \alpha^{n}\right)^{2/n-2}\left(\left|r0 - r\right|^{n} - 2\,\alpha^{n} n + 2\,\alpha^{n}\right) sin(\theta)^{2}}{2\,(r0 - r)^{2}\sqrt{\left(\left|r0 - r\right|^{n} + \alpha^{n}\right)^{2/n}}\,B}$$

$$R_{2,0,0,2} = -\frac{\left|r0 - r\right|^{2n} A}{2\,(r0 - r)^{2}\left(\left|r0 - r\right|^{n} + \alpha^{n}\right)^{2} B}$$

$$R_{2,0,2,0} = \frac{\left|r0 - r\right|^{2n} A}{2\,(r0 - r)^{2}\left(\left|r0 - r\right|^{n} + \alpha^{n}\right)^{2} B}$$

$$R_{2,1,1,2} = -\frac{\left|r0 - r\right|^{n}\left(\left|r0 - r\right|^{n} - 2\,\alpha^{n} n + 2\,\alpha^{n}\right)}{2\,(r0 - r)^{2}\left(\left|r0 - r\right|^{n} + \alpha^{n}\right)^{2}}$$

$$R_{2,1,2,1} = \frac{\left|r0 - r\right|^{n}\left(\left|r0 - r\right|^{n} - 2\,\alpha^{n} n + 2\,\alpha^{n}\right)}{2\,(r0 - r)^{2}\left(\left|r0 - r\right|^{n} + \alpha^{n}\right)^{2}}$$

$$R_{2,3,2,3} = \left(sin(\theta)^{2}\left(r0^{2}\left|r0 - r\right|^{2n} B - 2\,r\,r0\left|r0 - r\right|^{2n} B + r^{2}\left|r0 - r\right|^{2n} B + 2\,\alpha^{n} r0^{2}\left|r0 - r\right|^{n} B - 4\,\alpha^{n} r\,r0\left|r0 - r\right|^{n} B + 2\,\alpha^{n} r^{2}\left|r0 - r\right|^{n} B + \alpha^{2n} r0^{2} B - 2\,\alpha^{2n} r\,r0\,B + \alpha^{2n} r^{2} B - \left|r0 - r\right|^{2n}\sqrt{\left(\left|r0 - r\right|^{n} + \alpha^{n}\right)^{2/n}}\right)\right) / \left((r0 - r)^{2}\left(\left|r0 - r\right|^{n} + \alpha^{n}\right)^{2} B\right)$$

$$R_{2,3,3,2} = -\left(sin(\theta)^{2}\left(r0^{2}\left|r0 - r\right|^{2n} B - 2\,r\,r0\left|r0 - r\right|^{2n} B + r^{2}\left|r0 - r\right|^{2n} B + 2\,\alpha^{n} r0^{2}\left|r0 - r\right|^{n} B - 4\,\alpha^{n} r\,r0\left|r0 - r\right|^{n} B + 2\,\alpha^{n} r^{2}\left|r0 - r\right|^{n} B + \alpha^{2n} r0^{2} B - 2\,\alpha^{2n} r\,r0\,B + \alpha^{2n} r^{2} B - \left|r0 - r\right|^{2n}\sqrt{\left(\left|r0 - r\right|^{n} + \alpha^{n}\right)^{2/n}}\right)\right) / \left((r0 - r)^{2}\left(\left|r0 - r\right|^{n} + \alpha^{n}\right)^{2} B\right)$$

$$R_{3,0,0,3} = -\frac{\left|r0 - r\right|^{2n} A}{2\,(r0 - r)^{2}\left(\left|r0 - r\right|^{n} + \alpha^{n}\right)^{2} B}$$

$$R_{3,0,3,0} = \frac{\left|r0 - r\right|^{2n} A}{2\,(r0 - r)^{2}\left(\left|r0 - r\right|^{n} + \alpha^{n}\right)^{2} B}$$

$$R_{3,1,1,3} = -\frac{\left|r0 - r\right|^{n}\left(\left|r0 - r\right|^{n} - 2\,\alpha^{n} n + 2\,\alpha^{n}\right)}{2\,(r0 - r)^{2}\left(\left|r0 - r\right|^{n} + \alpha^{n}\right)^{2}}$$

$$R_{3,1,3,1} = \frac{\left|r0 - r\right|^{n}\left(\left|r0 - r\right|^{n} - 2\,\alpha^{n} n + 2\,\alpha^{n}\right)}{2\,(r0 - r)^{2}\left(\left|r0 - r\right|^{n} + \alpha^{n}\right)^{2}}$$

$$R_{3,2,2,3} = -\left(r0^{2}\left|r0 - r\right|^{2n} B - 2\,r\,r0\left|r0 - r\right|^{2n} B + r^{2}\left|r0 - r\right|^{2n} B + 2\,\alpha^{n} r0^{2}\left|r0 - r\right|^{n} B - 4\,\alpha^{n} r\,r0\left|r0 - r\right|^{n} B + 2\,\alpha^{n} r^{2}\left|r0 - r\right|^{n} B + \alpha^{2n} r0^{2} B - 2\,\alpha^{2n} r\,r0\,B + \alpha^{2n} r^{2} B - \left|r0 - r\right|^{2n}\sqrt{\left(\left|r0 - r\right|^{n} + \alpha^{n}\right)^{2/n}}\right) / \left((r0 - r)^{2}\left(\left|r0 - r\right|^{n} + \alpha^{n}\right)^{2} B\right)$$

$$R_{3,2,3,2} = \left(r0^2 \left|r0 - r\right|^{2n} B - 2\, r\, r0 \left|r0 - r\right|^{2n} B + r^2 \left|r0 - r\right|^{2n} B + 2\, \alpha^n\, r0^2 \left|r0 - r\right|^n B - 4\, \alpha^n\, r\, r0 \left|r0 - r\right|^n B + 2\, \alpha^n\, r^2 \left|r0 - r\right|^n B + \alpha^{2n}\, r0^2\, B - 2\, \alpha^{2n}\, r\, r0\, B + \alpha^{2n}\, r^2\, B - \left|r0 - r\right|^{2n} \sqrt{\left(\left|r0 - r\right|^n + \alpha^n\right)^{2/n}} \right) / \left((r0 - r)^2 \left(\left|r0 - r\right|^n + \alpha^n\right)^2 B \right)$$

```
(%i12)  /* Ricci tensor Ric[mu,nu] */
        for mu:0 thru 3 do {
        for nu:0 thru 3 do {
            Ric[mu,nu]: sum(R[lambda,mu,lambda,nu], lambda, 0, 3)
        }}$
```

```
(%i13)  /* dislplay Ric's being different from zero */
        for i:0 thru 3 do {
        for j:0 thru 3 do {
            Ric[i,j] : /*ratsimp*/(factor(Ric[i,j])),
            if Ric[i,j] # 0 then display(Ric[i,j])
            }}$
```

$$Ric_{0,0} = \frac{\left|r0 - r\right|^n \left(\left|r0 - r\right|^n + \alpha^n n - \alpha^n\right) A}{2\,(r0 - r)^2 \left(\left|r0 - r\right|^n + \alpha^n\right)^2 B}$$

$$Ric_{1,1} = \frac{\left|r0 - r\right|^n \left(3 \left|r0 - r\right|^n - 5\, \alpha^n n + 5\, \alpha^n\right)}{2\,(r0 - r)^2 \left(\left|r0 - r\right|^n + \alpha^n\right)^2}$$

$$Ric_{2,2} = \left(r0^2 \left|r0 - r\right|^{2n} \sqrt{\left(\left|r0 - r\right|^n + \alpha^n\right)^{2/n}}\, B - 2\, r\, r0 \left|r0 - r\right|^{2n} \sqrt{\left(\left|r0 - r\right|^n + \alpha^n\right)^{2/n}}\, B + r^2 \left|r0 - r\right|^{2n} \sqrt{\left(\left|r0 - r\right|^n + \alpha^n\right)^{2/n}}\, B + 2\, \alpha^n\, r0^2 \left|r0 - r\right|^n \sqrt{\left(\left|r0 - r\right|^n + \alpha^n\right)^{2/n}}\, B - 4\, \alpha^n\, r\, r0 \left|r0 - r\right|^n \sqrt{\left(\left|r0 - r\right|^n + \alpha^n\right)^{2/n}}\, B + 2\, \alpha^n\, r^2 \left|r0 - r\right|^n \sqrt{\left(\left|r0 - r\right|^n + \alpha^n\right)^{2/n}}\, B + \alpha^{2n}\, r0^2 \sqrt{\left(\left|r0 - r\right|^n + \alpha^n\right)^{2/n}}\, B - 2\, \alpha^{2n}\, r\, r0 \sqrt{\left(\left|r0 - r\right|^n + \alpha^n\right)^{2/n}}\, B + \alpha^{2n}\, r^2 \sqrt{\left(\left|r0 - r\right|^n + \alpha^n\right)^{2/n}}\, B - \left|r0 - r\right|^{2n} \left(\left|r0 - r\right|^n + \alpha^n\right)^{2/n} - \alpha^n\, n \left|r0 - r\right|^n \left(\left|r0 - r\right|^n + \alpha^n\right)^{2/n} + \alpha^n \left|r0 - r\right|^n \left(\left|r0 - r\right|^n + \alpha^n\right)^{2/n} \right) / \left((r0 - r)^2 \left(\left|r0 - r\right|^n + \alpha^n\right)^2 \sqrt{\left(\left|r0 - r\right|^n + \alpha^n\right)^{2/n}}\, B \right)$$

$$Ric_{3,3} = \left(\sin(\theta)^2 \left(r0^2 \left|r0 - r\right|^{2n} \sqrt{\left(\left|r0 - r\right|^n + \alpha^n\right)^{2/n}}\, B - 2\, r\, r0 \left|r0 - r\right|^{2n} \sqrt{\left(\left|r0 - r\right|^n + \alpha^n\right)^{2/n}}\, B + r^2 \left|r0 - r\right|^{2n} \sqrt{\left(\left|r0 - r\right|^n + \alpha^n\right)^{2/n}}\, B + 2\, \alpha^n\, r0^2 \left|r0 - r\right|^n \sqrt{\left(\left|r0 - r\right|^n + \alpha^n\right)^{2/n}}\, B - 4\, \alpha^n\, r\, r0 \left|r0 - r\right|^n \sqrt{\left(\left|r0 - r\right|^n + \alpha^n\right)^{2/n}}\, B + 2\, \alpha^n\, r^2 \left|r0 - r\right|^n \sqrt{\left(\left|r0 - r\right|^n + \alpha^n\right)^{2/n}}\, B + \alpha^{2n}\, r0^2 \sqrt{\left(\left|r0 - r\right|^n + \alpha^n\right)^{2/n}}\, B - 2\, \alpha^{2n}\, r\, r0 \sqrt{\left(\left|r0 - r\right|^n + \alpha^n\right)^{2/n}}\, B + \alpha^{2n}\, r^2 \sqrt{\left(\left|r0 - r\right|^n + \alpha^n\right)^{2/n}}\, B - \left|r0 - r\right|^{2n} \left(\left|r0 - r\right|^n + \alpha^n\right)^{2/n} -$$

$$\alpha^n\, n\, \left|r0 - r\right|^n \left(\left|r0 - r\right|^n + \alpha^n\right)^{2/n} + \alpha^n \left|r0 - r\right|^n \left(\left|r0 - r\right|^n + \alpha^n\right)^{2/n}\Big) \Big/ \Big((r0 - r)^2 \left(\left|r0 - r\right|^n + \alpha^n\right)^2 \sqrt{\left(\left|r0 - r\right|^n + \alpha^n\right)^{2/n}}\, B\Big)$$

```
(%i14)  /* Ricci Scalar */
        RicSc: sum(gContr[0,lambda]*Ric[lambda,0], lambda, 0, 3)
             +  sum(gContr[1,lambda]*Ric[lambda,1], lambda, 0, 3)
             +  sum(gContr[2,lambda]*Ric[lambda,2], lambda, 0, 3)
             +  sum(gContr[3,lambda]*Ric[lambda,3], lambda, 0, 3)
        ;
```

(%o14)

$$\Big(2\left(\left|r0 - r\right|^n + \alpha^n\right)^{-\frac{2}{n}-2} \Big(r0^2 \left|r0 - r\right|^{2n} \sqrt{\left(\left|r0 - r\right|^n + \alpha^n\right)^{2/n}}\, B - 2\, r\, r0 \left|r0 - r\right|^{2n} \sqrt{\left(\left|r0 - r\right|^n + \alpha^n\right)^{2/n}}\, B + r^2 \left|r0 - r\right|^{2n} \sqrt{\left(\left|r0 - r\right|^n + \alpha^n\right)^{2/n}}\, B + 2\, \alpha^n\, r0^2 \left|r0 - r\right|^n \sqrt{\left(\left|r0 - r\right|^n + \alpha^n\right)^{2/n}}\, B - 4\, \alpha^n\, r\, r0 \left|r0 - r\right|^n \sqrt{\left(\left|r0 - r\right|^n + \alpha^n\right)^{2/n}}\, B + 2\, \alpha^n\, r^2 \left|r0 - r\right|^n \sqrt{\left(\left|r0 - r\right|^n + \alpha^n\right)^{2/n}}\, B + \alpha^{2n}\, r0^2 \sqrt{\left(\left|r0 - r\right|^n + \alpha^n\right)^{2/n}}\, B - 2\, \alpha^{2n}\, r\, r0 \sqrt{\left(\left|r0 - r\right|^n + \alpha^n\right)^{2/n}}\, B + \alpha^{2n}\, r^2 \sqrt{\left(\left|r0 - r\right|^n + \alpha^n\right)^{2/n}}\, B - \left|r0 - r\right|^{2n} \left(\left|r0 - r\right|^n + \alpha^n\right)^{2/n} - \alpha^n\, n \left|r0 - r\right|^n \left(\left|r0 - r\right|^n + \alpha^n\right)^{2/n} + \alpha^n \left|r0 - r\right|^n \left(\left|r0 - r\right|^n + \alpha^n\right)^{2/n}\Big) \Big/ \Big((r0 - r)^2 \sqrt{\left(\left|r0 - r\right|^n + \alpha^n\right)^{2/n}}\, B\Big) +$$

$$\frac{\left|r0 - r\right|^n \left(\left|r0 - r\right|^n + \alpha^n\right)^{-\frac{2}{n}-2} \sqrt{\left(\left|r0 - r\right|^n + \alpha^n\right)^{2/n}} \left(3\left|r0 - r\right|^n - 5\,\alpha^n\, n + 5\,\alpha^n\right)}{2\,(r0 - r)^2\, B} -$$

$$\frac{\left|r0 - r\right|^n \left(\left|r0 - r\right|^n + \alpha^n\right)^{-\frac{2}{n}-2} \sqrt{\left(\left|r0 - r\right|^n + \alpha^n\right)^{2/n}} \left(\left|r0 - r\right|^n + \alpha^n\, n - \alpha^n\right)}{2\,(r0 - r)^2\, B}$$

```
(%i15)  ratsimp(RicSc);
```

(%o15)

$$\Big(\sqrt{\left(\left|r0 - r\right|^n + \alpha^n\right)^{2/n}} \left(\left(2\, r0^2 - 4\, r\, r0 + 2\, r^2\right)\left|r0 - r\right|^{2n} + \left(4\,\alpha^n\, r0^2 - 8\,\alpha^n\, r\, r0 + 4\,\alpha^n\, r^2\right)\left|r0 - r\right|^n + 2\,\alpha^{2n}\, r0^2 - 4\,\alpha^{2n}\, r\, r0 + 2\,\alpha^{2n}\, r^2\right) B + \left(\left|r0 - r\right|^n + \alpha^n\right)^{2/n} \left(\left(5\,\alpha^n - 5\,\alpha^n\, n\right)\left|r0 - r\right|^n - \left|r0 - r\right|^{2n}\right)\Big) \Big/ \Big(\left(\left|r0 - r\right|^n + \alpha^n\right)^{2/n} \sqrt{\left(\left|r0 - r\right|^n + \alpha^n\right)^{2/n}} \left(\left(r0^2 - 2\, r\, r0 + r^2\right)\left|r0 - r\right|^{2n} + \left(2\,\alpha^n\, r0^2 - 4\,\alpha^n\, r\, r0 + 2\,\alpha^n\, r^2\right)\left|r0 - r\right|^n + \alpha^{2n}\, r0^2 - 2\,\alpha^{2n}\, r\, r0 + \alpha^{2n}\, r^2\right) B\Big)$$

```
(%i16)
```

```
/* Test for R^q */
for mu:   0 thru 3 do (
for sigma:0 thru 3 do (
for nu:   0 thru 3 do (
for rho:  0 thru 3 do (
    R_q: R[mu,sigma,nu,rho] + R[mu,rho,sigma,nu] + R[mu,nu,rho,sigma],
    if R_q # 0 then (
        display("=============Einstein equation R^q=0 not fulfilled! "),
        display(mu,sigma,nu,rho),
        display(R_q)
    )
))));
```

(%o16) *done*

```
(%i17) /* Raising of indices,
          contravarinat metric el. is g^x^x(contr.) = 1/g_x_x(cov.) */
       /*print("Riemann elements R^0_1^0^1, R^0_2^0^2, R^0_3^0^3:");*/

       R0101: f(0,1);
       R0202: f(0,2);
       R0303: f(0,3);
```

$$\text{(\%o17)}\quad -\frac{\left|r0-r\right|^{n}\left(\left|r0-r\right|^{n}+\alpha^{n}\right)^{-\frac{2}{n}-2}\left(\left|r0-r\right|^{n}-\alpha^{n}\,n+\alpha^{n}\right)}{2\left(r0-r\right)^{2}A\,B}$$

$$\text{(\%o18)}\quad \frac{\left|r0-r\right|^{2\,n}\left(\left|r0-r\right|^{n}+\alpha^{n}\right)^{-\frac{2}{n}-2}}{2\left(r0-r\right)^{2}A\,B}$$

$$\text{(\%o19)}\quad \frac{\left|r0-r\right|^{2\,n}\left(\left|r0-r\right|^{n}+\alpha^{n}\right)^{-\frac{2}{n}-2}}{2\left(r0-r\right)^{2}A\,B}$$

```
(%i20) R0101: factor(R0101);
       R0202: factor(R0202);
       R0303: factor(R0303);
```

$$\text{(\%o20)}\quad -\frac{\left|r0-r\right|^{n}\left(\left|r0-r\right|^{n}+\alpha^{n}\right)^{-\frac{2}{n}-2}\left(\left|r0-r\right|^{n}-\alpha^{n}\,n+\alpha^{n}\right)}{2\left(r0-r\right)^{2}A\,B}$$

$$\text{(\%o21)}\quad \frac{\left|r0-r\right|^{2\,n}\left(\left|r0-r\right|^{n}+\alpha^{n}\right)^{-\frac{2}{n}-2}}{2\left(r0-r\right)^{2}A\,B}$$

$$\text{(\%o22)}\quad \frac{\left|r0-r\right|^{2\,n}\left(\left|r0-r\right|^{n}+\alpha^{n}\right)^{-\frac{2}{n}-2}}{2\left(r0-r\right)^{2}A\,B}$$

(%i23)
```
R1010: f(1,0);
R1212: f(1,2);
R1313: f(1,3);
```

(%o23)
$$\frac{\left|r0-r\right|^{n}\left(\left|r0-r\right|^{n}+\alpha^{n}\right)^{-\frac{2}{n}-2}\left(\left|r0-r\right|^{n}-\alpha^{n}n+\alpha^{n}\right)}{2\left(r0-r\right)^{2}B^{2}}$$

(%o24)
$$\frac{\left|r0-r\right|^{n}\left(\left|r0-r\right|^{n}+\alpha^{n}\right)^{-\frac{2}{n}-2}\left(\left|r0-r\right|^{n}-2\,\alpha^{n}n+2\,\alpha^{n}\right)}{2\left(r0-r\right)^{2}B^{2}}$$

(%o25)
$$\frac{\left|r0-r\right|^{n}\left(\left|r0-r\right|^{n}+\alpha^{n}\right)^{-\frac{2}{n}-2}\left(\left|r0-r\right|^{n}-2\,\alpha^{n}n+2\,\alpha^{n}\right)}{2\left(r0-r\right)^{2}B^{2}}$$

(%i26)
```
R1010: factor(R1010);
R1212: factor(R1212);
R1313: factor(R1313);
```

(%o26)
$$\frac{\left|r0-r\right|^{n}\left(\left|r0-r\right|^{n}+\alpha^{n}\right)^{-\frac{2}{n}-2}\left(\left|r0-r\right|^{n}-\alpha^{n}n+\alpha^{n}\right)}{2\left(r0-r\right)^{2}B^{2}}$$

(%o27)
$$\frac{\left|r0-r\right|^{n}\left(\left|r0-r\right|^{n}+\alpha^{n}\right)^{-\frac{2}{n}-2}\left(\left|r0-r\right|^{n}-2\,\alpha^{n}n+2\,\alpha^{n}\right)}{2\left(r0-r\right)^{2}B^{2}}$$

(%o28)
$$\frac{\left|r0-r\right|^{n}\left(\left|r0-r\right|^{n}+\alpha^{n}\right)^{-\frac{2}{n}-2}\left(\left|r0-r\right|^{n}-2\,\alpha^{n}n+2\,\alpha^{n}\right)}{2\left(r0-r\right)^{2}B^{2}}$$

(%i29)
```
R2020: f(2,0);
R2121: f(2,1);
R2323: f(2,3);
```

(%o29)
$$-\frac{\left|r0-r\right|^{2\,n}\left(\left|r0-r\right|^{n}+\alpha^{n}\right)^{-\frac{4}{n}-2}\sqrt{\left(\left|r0-r\right|^{n}+\alpha^{n}\right)^{2/n}}}{2\left(r0-r\right)^{2}B}$$

(%o30)
$$\frac{\left|r0-r\right|^{n}\left(\left|r0-r\right|^{n}+\alpha^{n}\right)^{-\frac{4}{n}-2}\sqrt{\left(\left|r0-r\right|^{n}+\alpha^{n}\right)^{2/n}}\left(\left|r0-r\right|^{n}-2\,\alpha^{n}n+2\,\alpha^{n}\right)}{2\left(r0-r\right)^{2}B}$$

(%o31)
$$\left(\left|r0-r\right|^{n}+\alpha^{n}\right)^{-\frac{4}{n}-2}\left(r0^{2}\left|r0-r\right|^{2\,n}B-2\,r\,r0\left|r0-r\right|^{2\,n}B+r^{2}\right.$$

$$\left|r0 - r\right|^{2\,n}\,B + 2\,\alpha^{n}\,r0^{2}\,\left|r0 - r\right|^{n}\,B - 4\,\alpha^{n}\,r\,r0\,\left|r0 - r\right|^{n}\,B + 2\,\alpha^{n}\,r^{2}\,\left|r0 - r\right|^{n}\,B + \alpha^{2\,n}\,r0^{2}\,B - 2\,\alpha^{2\,n}\,r\,r0\,B + \alpha^{2\,n}\,r^{2}\,B - \left|r0 - r\right|^{2\,n}\sqrt{\left(\left|r0 - r\right|^{n} + \alpha^{n}\right)^{2/n}}\,)\,)\,/\,(\,(r0 - r)^{2}\,B\,)$$

(%i32)
```
R2020: factor(R2020);
R2121: factor(R2121);
R2323: factor(R2323);
```

(%o32)
$$-\frac{\left|r0 - r\right|^{2\,n}\left(\left|r0 - r\right|^{n} + \alpha^{n}\right)^{-\frac{4}{n} - 2}\sqrt{\left(\left|r0 - r\right|^{n} + \alpha^{n}\right)^{2/n}}}{2\,(r0 - r)^{2}\,B}$$

(%o33)
$$\frac{\left|r0 - r\right|^{n}\left(\left|r0 - r\right|^{n} + \alpha^{n}\right)^{-\frac{4}{n} - 2}\sqrt{\left(\left|r0 - r\right|^{n} + \alpha^{n}\right)^{2/n}}\left(\left|r0 - r\right|^{n} - 2\,\alpha^{n}\,n + 2\,\alpha^{n}\right)}{2\,(r0 - r)^{2}\,B}$$

(%o34)
$$(\,\left(\left|r0 - r\right|^{n} + \alpha^{n}\right)^{-\frac{4}{n} - 2}\,(\,r0^{2}\,\left|r0 - r\right|^{2\,n}\,B - 2\,r\,r0\,\left|r0 - r\right|^{2\,n}\,B + r^{2}\,\left|r0 - r\right|^{2\,n}\,B + 2\,\alpha^{n}\,r0^{2}\,\left|r0 - r\right|^{n}\,B - 4\,\alpha^{n}\,r\,r0\,\left|r0 - r\right|^{n}\,B + 2\,\alpha^{n}\,r^{2}\,\left|r0 - r\right|^{n}\,B + \alpha^{2\,n}\,r0^{2}\,B - 2\,\alpha^{2\,n}\,r\,r0\,B + \alpha^{2\,n}\,r^{2}\,B - \left|r0 - r\right|^{2\,n}\sqrt{\left(\left|r0 - r\right|^{n} + \alpha^{n}\right)^{2/n}}\,)\,)\,/\,(\,(r0 - r)^{2}\,B\,)$$

(%i35)
```
R3030: f(3,0);
R3131: f(3,1);
R3232: f(3,2);
```

(%o35)
$$-\frac{\left|r0 - r\right|^{2\,n}\left(\left|r0 - r\right|^{n} + \alpha^{n}\right)^{-\frac{4}{n} - 2}\sqrt{\left(\left|r0 - r\right|^{n} + \alpha^{n}\right)^{2/n}}}{2\,(r0 - r)^{2}\,\sin(\theta)^{2}\,B}$$

(%o36)
$$\frac{\left|r0 - r\right|^{n}\left(\left|r0 - r\right|^{n} + \alpha^{n}\right)^{-\frac{4}{n} - 2}\sqrt{\left(\left|r0 - r\right|^{n} + \alpha^{n}\right)^{2/n}}\left(\left|r0 - r\right|^{n} - 2\,\alpha^{n}\,n + 2\,\alpha^{n}\right)}{2\,(r0 - r)^{2}\,\sin(\theta)^{2}\,B}$$

(%o37)
$$(\,\left(\left|r0 - r\right|^{n} + \alpha^{n}\right)^{-\frac{4}{n} - 2}\,(\,r0^{2}\,\left|r0 - r\right|^{2\,n}\,B - 2\,r\,r0\,\left|r0 - r\right|^{2\,n}\,B + r^{2}\,\left|r0 - r\right|^{2\,n}\,B + 2\,\alpha^{n}\,r0^{2}\,\left|r0 - r\right|^{n}\,B - 4\,\alpha^{n}\,r\,r0\,\left|r0 - r\right|^{n}\,B + 2\,\alpha^{n}\,r^{2}\,\left|r0 - r\right|^{n}\,B + \alpha^{2\,n}\,r0^{2}\,B - 2\,\alpha^{2\,n}\,r\,r0\,B + \alpha^{2\,n}\,r^{2}\,B - \left|r0 - r\right|^{2\,n}\sqrt{\left(\left|r0 - r\right|^{n} + \alpha^{n}\right)^{2/n}}\,)\,)\,/\,(\,(r0 - r)^{2}\,\sin(\theta)^{2}\,B\,)$$

(%i38)
```
R3030: factor(R3030);
R3131: factor(R3131);
R3232: factor(R3232);
```

(%o38) $$-\frac{\left|r0-r\right|^{2\,n}\left(\left|r0-r\right|^{n}+\alpha^{n}\right)^{-\frac{4}{n}-2}\sqrt{\left(\left|r0-r\right|^{n}+\alpha^{n}\right)^{2/n}}}{2\,(r0-r)^{2}\,\sin(\theta)^{2}\,B}$$

(%o39) $$\frac{\left|r0-r\right|^{n}\left(\left|r0-r\right|^{n}+\alpha^{n}\right)^{-\frac{4}{n}-2}\sqrt{\left(\left|r0-r\right|^{n}+\alpha^{n}\right)^{2/n}}\left(\left|r0-r\right|^{n}-2\,\alpha^{n}\,n+2\,\alpha^{n}\right)}{2\,(r0-r)^{2}\,\sin(\theta)^{2}\,B}$$

(%o40) $$\left(\left(\left|r0-r\right|^{n}+\alpha^{n}\right)^{-\frac{4}{n}-2}\left(r0^{2}\left|r0-r\right|^{2\,n}B-2\,r\,r0\left|r0-r\right|^{2\,n}B+r^{2}\left|r0-r\right|^{2\,n}B+2\,\alpha^{n}\,r0^{2}\left|r0-r\right|^{n}B-4\,\alpha^{n}\,r\,r0\left|r0-r\right|^{n}B+2\,\alpha^{n}\,r^{2}\left|r0-r\right|^{n}B+\alpha^{2\,n}\,r0^{2}\,B-2\,\alpha^{2\,n}\,r\,r0\,B+\alpha^{2\,n}\,r^{2}\,B-\left|r0-r\right|^{2\,n}\sqrt{\left(\left|r0-r\right|^{n}+\alpha^{n}\right)^{2/n}}\right)\right)/\left((r0-r)^{2}\,\sin(\theta)^{2}\,B\right)$$

(%i41)
```
/* Coulomb law */
DivE : R0101 + R0202 + R0303;
```

(%o41) $$\frac{\left|r0-r\right|^{2\,n}\left(\left|r0-r\right|^{n}+\alpha^{n}\right)^{-\frac{2}{n}-2}}{(r0-r)^{2}\,A\,B}-\frac{\left|r0-r\right|^{n}\left(\left|r0-r\right|^{n}+\alpha^{n}\right)^{-\frac{2}{n}-2}\left(\left|r0-r\right|^{n}-\alpha^{n}\,n+\alpha^{n}\right)}{2\,(r0-r)^{2}\,A\,B}$$

(%i42)
```
ev(ratsimp(DivE),diff);
```

(%o42) $$\left(\left|r0-r\right|^{2\,n}+\left(\alpha^{n}\,n-\alpha^{n}\right)\left|r0-r\right|^{n}\right)/\left(\left(\left|r0-r\right|^{n}+\alpha^{n}\right)^{2/n}\left((2\,r0^{2}-4\,r\,r0+2\,r^{2})\left|r0-r\right|^{2\,n}+(4\,\alpha^{n}\,r0^{2}-8\,\alpha^{n}\,r\,r0+4\,\alpha^{n}\,r^{2})\left|r0-r\right|^{n}+2\,\alpha^{2\,n}\,r0^{2}-4\,\alpha^{2\,n}\,r\,r0+2\,\alpha^{2\,n}\,r^{2}\right)A\,B\right)$$

(%i43)
```
/* J[r] */
Jr : -(R1010 + R1212 + R1313);
```

(%o43) $$-\frac{\left|r0-r\right|^{n}\left(\left|r0-r\right|^{n}+\alpha^{n}\right)^{-\frac{2}{n}-2}\left(\left|r0-r\right|^{n}-\alpha^{n}\,n+\alpha^{n}\right)}{2\,(r0-r)^{2}\,B^{2}}-\frac{\left|r0-r\right|^{n}\left(\left|r0-r\right|^{n}+\alpha^{n}\right)^{-\frac{2}{n}-2}\left(\left|r0-r\right|^{n}-2\,\alpha^{n}\,n+2\,\alpha^{n}\right)}{(r0-r)^{2}\,B^{2}}$$

(%i44)
```
ratsimp(Jr);
```

(%o44) $$-\left(3\left|r0-r\right|^{2\,n}+\left(5\,\alpha^{n}-5\,\alpha^{n}\,n\right)\left|r0-r\right|^{n}\right)/\left(\left(\left|r0-r\right|^{n}+\alpha^{n}\right)^{2/n}\left((2\,r0^{2}-4\,r\,r0+2\,r^{2})\left|r0-r\right|^{2\,n}+(4\,\alpha^{n}\,r0^{2}-8\,\alpha^{n}\,r\,r0+4\,\alpha^{n}\,r^{2})\left|r0-r\right|^{n}+2\,\alpha^{2\,n}\,r0^{2}-4\,\alpha^{2\,n}\,r\,r0+2\,\alpha^{2\,n}\,r^{2}\right)B^{2}\right)$$

(%i45)
```
/* J[theta] */
Jtheta : -(R2020 + R2121 + R2323);
```

(%o45)
$$-\left(\left(\left|r0-r\right|^{n}+\alpha^{n}\right)^{-\frac{4}{n}-2}\left(r0^{2}\left|r0-r\right|^{2n}B-2\,r\,r0\left|r0-r\right|^{2n}B+r^{2}\left|r0-r\right|^{2n}B+2\,\alpha^{n}r0^{2}\left|r0-r\right|^{n}B-4\,\alpha^{n}r\,r0\left|r0-r\right|^{n}B+2\,\alpha^{n}r^{2}\left|r0-r\right|^{n}B+\alpha^{2n}r0^{2}B-2\,\alpha^{2n}r\,r0\,B+\alpha^{2n}r^{2}B-\left|r0-r\right|^{2n}\sqrt{\left(\left|r0-r\right|^{n}+\alpha^{n}\right)^{2/n}}\right)\right)/\left(\left(r0-r\right)^{2}B\right)+\frac{\left|r0-r\right|^{2n}\left(\left|r0-r\right|^{n}+\alpha^{n}\right)^{-\frac{4}{n}-2}\sqrt{\left(\left|r0-r\right|^{n}+\alpha^{n}\right)^{2/n}}}{2\left(r0-r\right)^{2}B}-\frac{\left|r0-r\right|^{n}\left(\left|r0-r\right|^{n}+\alpha^{n}\right)^{-\frac{4}{n}-2}\sqrt{\left(\left|r0-r\right|^{n}+\alpha^{n}\right)^{2/n}}\left(\left|r0-r\right|^{n}-2\,\alpha^{n}n+2\,\alpha^{n}\right)}{2\left(r0-r\right)^{2}B}$$

(%i46)
```
ratsimp(Jtheta);
```

(%o46)
$$\left(\left(\left(-r0^{2}+2\,r\,r0-r^{2}\right)\left|r0-r\right|^{2n}+\left(-2\,\alpha^{n}r0^{2}+4\,\alpha^{n}r\,r0-2\,\alpha^{n}r^{2}\right)\left|r0-r\right|^{n}-\alpha^{2n}r0^{2}+2\,\alpha^{2n}r\,r0-\alpha^{2n}r^{2}\right)B+\sqrt{\left(\left|r0-r\right|^{n}+\alpha^{n}\right)^{2/n}}\left(\left|r0-r\right|^{2n}+\left(\alpha^{n}n-\alpha^{n}\right)\left|r0-r\right|^{n}\right)\right)/\left(\left(\left|r0-r\right|^{n}+\alpha^{n}\right)^{4/n}\left(\left(r0^{2}-2\,r\,r0+r^{2}\right)\left|r0-r\right|^{2n}+\left(2\,\alpha^{n}r0^{2}-4\,\alpha^{n}r\,r0+2\,\alpha^{n}r^{2}\right)\left|r0-r\right|^{n}+\alpha^{2n}r0^{2}-2\,\alpha^{2n}r\,r0+\alpha^{2n}r^{2}\right)B\right)$$

(%i47)
```
/* J[phi] */
Jphi : -(R3030 + R3131 + R3232);
```

(%o47)
$$-\left(\left(\left|r0-r\right|^{n}+\alpha^{n}\right)^{-\frac{4}{n}-2}\left(r0^{2}\left|r0-r\right|^{2n}B-2\,r\,r0\left|r0-r\right|^{2n}B+r^{2}\left|r0-r\right|^{2n}B+2\,\alpha^{n}r0^{2}\left|r0-r\right|^{n}B-4\,\alpha^{n}r\,r0\left|r0-r\right|^{n}B+2\,\alpha^{n}r^{2}\left|r0-r\right|^{n}B+\alpha^{2n}r0^{2}B-2\,\alpha^{2n}r\,r0\,B+\alpha^{2n}r^{2}B-\left|r0-r\right|^{2n}\sqrt{\left(\left|r0-r\right|^{n}+\alpha^{n}\right)^{2/n}}\right)\right)/\left(\left(r0-r\right)^{2}\sin(\theta)^{2}B\right)+\frac{\left|r0-r\right|^{2n}\left(\left|r0-r\right|^{n}+\alpha^{n}\right)^{-\frac{4}{n}-2}\sqrt{\left(\left|r0-r\right|^{n}+\alpha^{n}\right)^{2/n}}}{2\left(r0-r\right)^{2}\sin(\theta)^{2}B}-\frac{\left|r0-r\right|^{n}\left(\left|r0-r\right|^{n}+\alpha^{n}\right)^{-\frac{4}{n}-2}\sqrt{\left(\left|r0-r\right|^{n}+\alpha^{n}\right)^{2/n}}\left(\left|r0-r\right|^{n}-2\,\alpha^{n}n+2\,\alpha^{n}\right)}{2\left(r0-r\right)^{2}\sin(\theta)^{2}B}$$

(%i48)
```
ratsimp(Jphi);
```

(%o48) $$\left(\left(\left(-r0^2 + 2\,r\,r0 - r^2 \right) \left| r0 - r \right|^{2\,n} + \left(-2\,\alpha^n\,r0^2 + 4\,\alpha^n\,r\,r0 - 2\,\alpha^n\,r^2 \right) \left| r0 - r \right|^n - \alpha^{2\,n}\,r0^2 + 2\,\alpha^{2\,n}\,r\,r0 - \alpha^{2\,n}\,r^2 \right) B + \sqrt{\left(\left| r0 - r \right|^n + \alpha^n \right)^{2/n}} \left(\left| r0 - r \right|^{2\,n} + \left(\alpha^n\,n - \alpha^n \right) \left| r0 - r \right|^n \right) \right) / \left(\left(\left| r0 - r \right|^n + \alpha^n \right)^{4/n} \left(\left(r0^2 - 2\,r\,r0 + r^2 \right) \left| r0 - r \right|^{2\,n} + \left(2\,\alpha^n\,r0^2 - 4\,\alpha^n\,r\,r0 + 2\,\alpha^n\,r^2 \right) \left| r0 - r \right|^n + \alpha^{2\,n}\,r0^2 - 2\,\alpha^{2\,n}\,r\,r0 + \alpha^{2\,n}\,r^2 \right) sin(\theta)^2\,B \right)$$

(%i49)
```
DivE_p: ratsimp(ev(DivE,[r0=0,alpha=1,n=3, A=1, B=1]));
```

(%o49) $$-\frac{\left(-2\left| r \right|^3 - r^6 \right)\left(\left| r \right|^3 + 1 \right)^{1/3}}{2\,r^2\left| r \right|^9 + 6\,r^2\left| r \right|^3 + 6\,r^8 + 2\,r^2}$$

(%i50)
```
Jr_p: ratsimp(ev(Jr,[r0=0,alpha=1,n=3, A=1, B=1]));
```

(%o50) $$-\frac{\left(3\,r^6 - 10\left| r \right|^3 \right)\left(\left| r \right|^3 + 1 \right)^{1/3}}{2\,r^2\left| r \right|^9 + 6\,r^2\left| r \right|^3 + 6\,r^8 + 2\,r^2}$$

(%i51)
```
Jtheta_p: ratsimp(ev(Jtheta,[r0=0,alpha=1,n=3, A=1, B=1]));
```

(%o51) $$-\frac{\left(-4\left| r \right|^3 - 2\,r^6 \right)\left(\left| r \right|^3 + 1 \right)^{1/3} + 4\,r^2\left| r \right|^3 + 2\,r^8 + 2\,r^2}{\left(\left| r \right|^3 + 1 \right)^{1/3}\left(2\,r^2\left| r \right|^9 + 6\,r^2\left| r \right|^3 + 6\,r^8 + 2\,r^2 \right)}$$

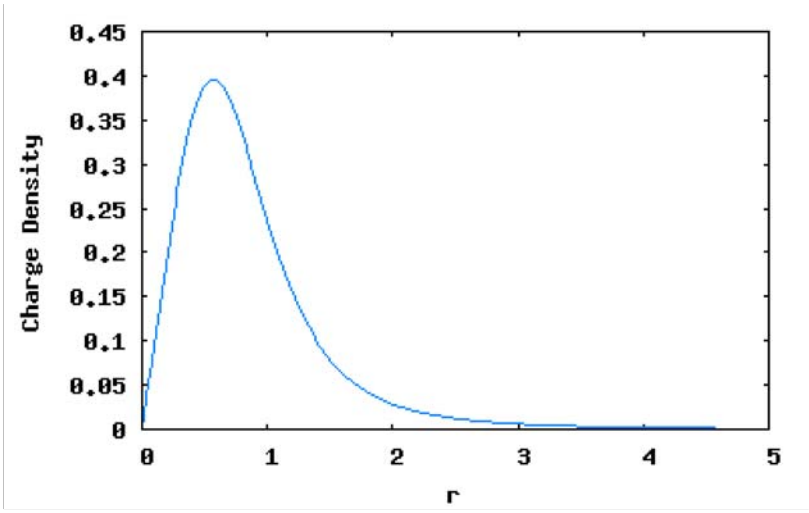
(%i52)
```
Jphi_p: ratsimp(ev(Jphi,[r0=0,alpha=1,n=3, A=1, B=1]));
```

(%o52) $$-\frac{\left(-4\left| r \right|^3 - 2\,r^6 \right)\left(\left| r \right|^3 + 1 \right)^{1/3} + 4\,r^2\left| r \right|^3 + 2\,r^8 + 2\,r^2}{\left(\left| r \right|^3 + 1 \right)^{1/3}\left(2\,r^2\left| r \right|^9 + 6\,r^2\left| r \right|^3 + 6\,r^8 + 2\,r^2 \right) sin(\theta)^2}$$

(%i53)
```
wxplot2d([DivE_p], [r,0,5],[y,0,.45], [gnuplot_preamble, "set zeroaxis;"],
[xlabel, "r"], [ylabel, "Charge Density"])$
```

Output file "C:/Documents and Settings/Administrator/maxout.png".

(%t53)

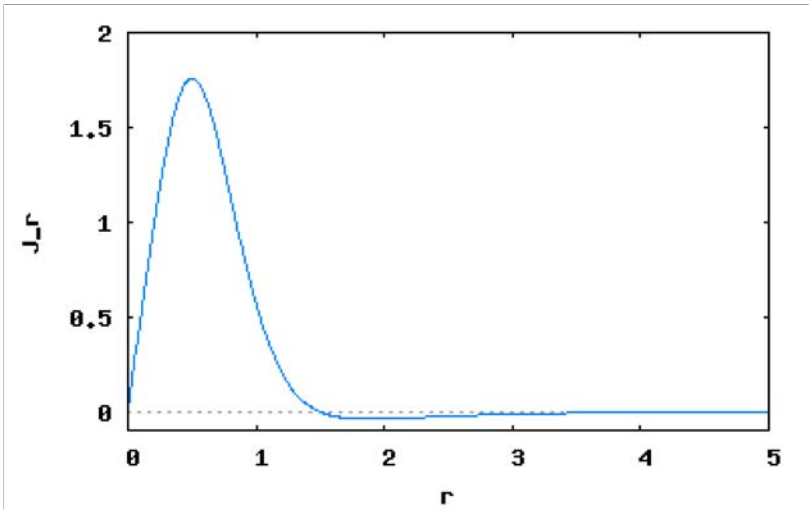


(%i54)

```
wxplot2d([Jr_p], [r,0,5],[y,-.1,2], [gnuplot_preamble, "set zeroaxis;"],
[xlabel, "r"], [ylabel, "J_r"])$
```

Output file "C:/Documents and Settings/Administrator/maxout.png".

(%t54)

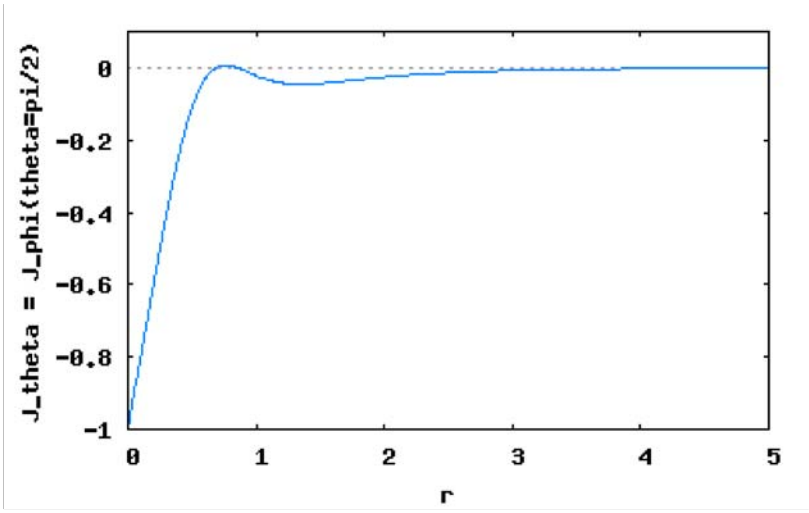


(%i55)

```
wxplot2d([Jtheta_p], [r,0,5],[y,-1,.1], [gnuplot_preamble, "set zeroaxis;"],
[xlabel, "r"], [ylabel, "J_theta = J_phi(theta=pi/2)"])$
```

Output file "C:/Documents and Settings/Administrator/maxout.png".

(%t55)



(%i56) `DivE_p: ratsimp(ev(DivE,[r0=1,alpha=1,n=1, A=1, B=1]));`

(%o56) $$\frac{1}{8\left|r-1\right|^3+8\left|r-1\right|+2\left(r-1\right)^4+12\left(r-1\right)^2+2}$$

(%i57) `Jr_p: ratsimp(ev(Jr,[r0=1,alpha=1,n=1, A=1, B=1]));`

(%o57) $$-\frac{3}{8\left|r-1\right|^3+8\left|r-1\right|+2\left(r-1\right)^4+12\left(r-1\right)^2+2}$$

(%i58) `Jtheta_p: ratsimp(ev(Jtheta,[r0=1,alpha=1,n=1, A=1, B=1]));`

(%o58) $$-\frac{\left|r-1\right|+r^2-2\,r+1}{6\left|r-1\right|^5+20\left|r-1\right|^3+6\left|r-1\right|+\left(r-1\right)^6+15\left(r-1\right)^4+15\left(r-1\right)^2+1}$$

(%i59) `Jphi_p: ratsimp(ev(Jphi,[r0=1,alpha=1,n=1, A=1, B=1]));`

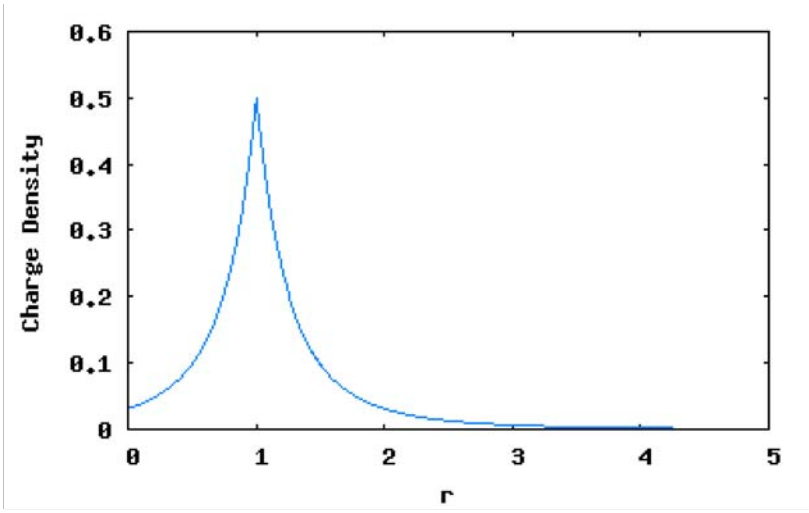
(%o59) $$-\frac{\left|r-1\right|+r^2-2\,r+1}{\left(6\left|r-1\right|^5+20\left|r-1\right|^3+6\left|r-1\right|+\left(r-1\right)^6+15\left(r-1\right)^4+15\left(r-1\right)^2+1\right)\sin\left(\theta\right)^2}$$

(%i60)

```
wxplot2d([DivE_p], [r,0,5],[y,0,.6], [gnuplot_preamble, "set zeroaxis;"],
[xlabel, "r"], [ylabel, "Charge Density"])$
```

Output file "C:/Documents and Settings/Administrator/maxout.png".

(%t60)

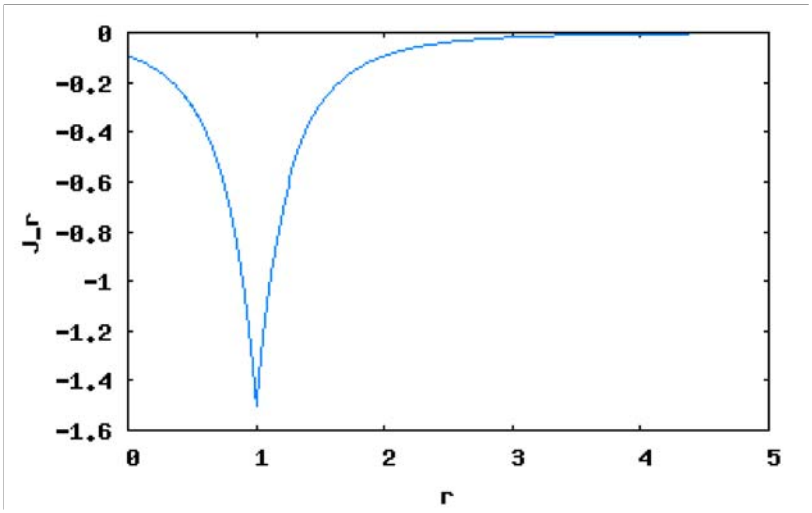


(%i61)

```
wxplot2d([Jr_p], [r,0,5],[y,-1.6,0], [gnuplot_preamble, "set zeroaxis;"],
[xlabel, "r"], [ylabel, "J_r"])$
```

Output file "C:/Documents and Settings/Administrator/maxout.png".

(%t61)

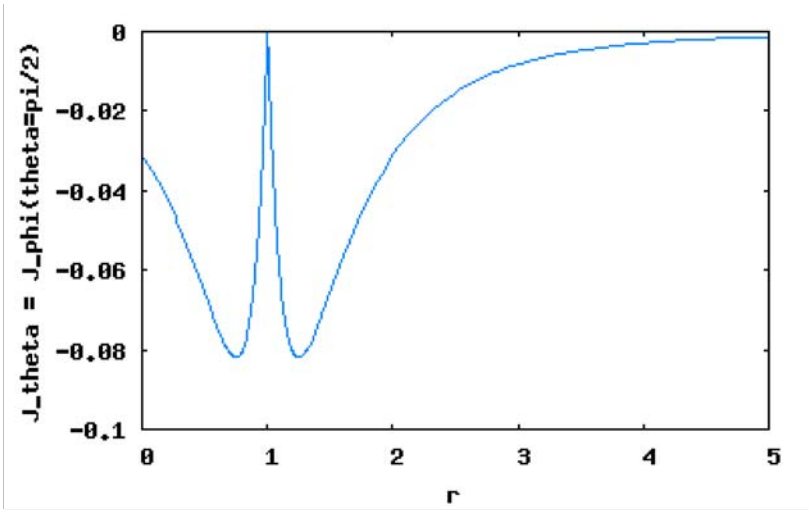


(%i62)

```
wxplot2d([Jtheta_p], [r,0,5],[y,-.1,0], [gnuplot_preamble, "set zeroaxis;"],
[xlabel, "r"], [ylabel, "J_theta = J_phi(theta=pi/2)"])$
```

Output file "C:/Documents and Settings/Administrator/maxout.png".

(%t62)



(%i63)
```
DivE_p: ratsimp(ev(DivE,[r0=0,alpha=0,n=1, A=1, B=1]));
```

(%o63) $$\frac{1}{2\,r^4}$$

(%i64)
```
Jr_p: ratsimp(ev(Jr,[r0=0,alpha=0,n=1, A=1, B=1]));
```

(%o64) $$-\frac{3}{2\,r^4}$$

(%i65)
```
Jtheta_p: ratsimp(ev(Jtheta,[r0=0,alpha=0,n=1, A=1, B=1]));
```

(%o65) $$\frac{|r|-r^2}{r^6}$$

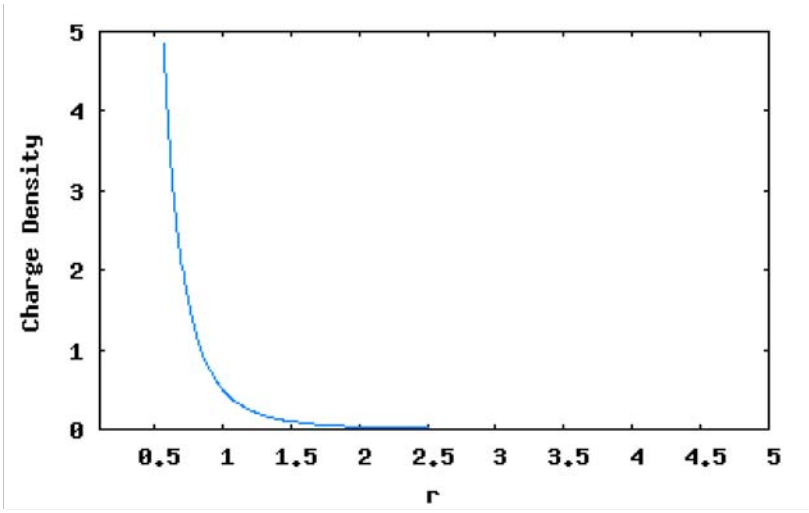
(%i66)
```
Jphi_p: ratsimp(ev(Jphi,[r0=0,alpha=0,n=1, A=1, B=1, theta=%pi/2]));
```

(%o66) $$\frac{|r|-r^2}{r^6}$$

(%i67)
```
wxplot2d([DivE_p], [r,.1,5],[y,0,5], [gnuplot_preamble, "set zeroaxis;"],
[xlabel, "r"], [ylabel, "Charge Density"])$
```

```
Output file "C:/Documents and Settings/Administrator/maxout.png".
```

(%t67)

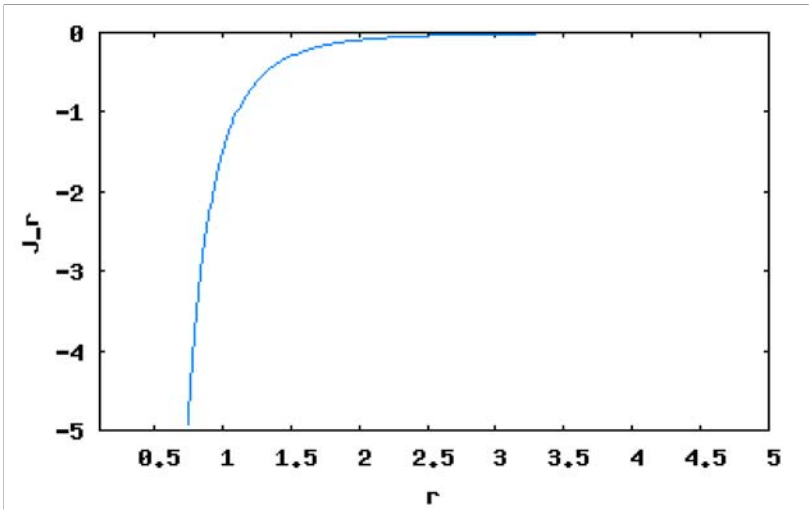


(%i68)

```
wxplot2d([Jr_p], [r,.1,5],[y,-5,0], [gnuplot_preamble, "set zeroaxis;"],
[xlabel, "r"], [ylabel, "J_r"])$
```

Output file "C:/Documents and Settings/Administrator/maxout.png".

(%t68)

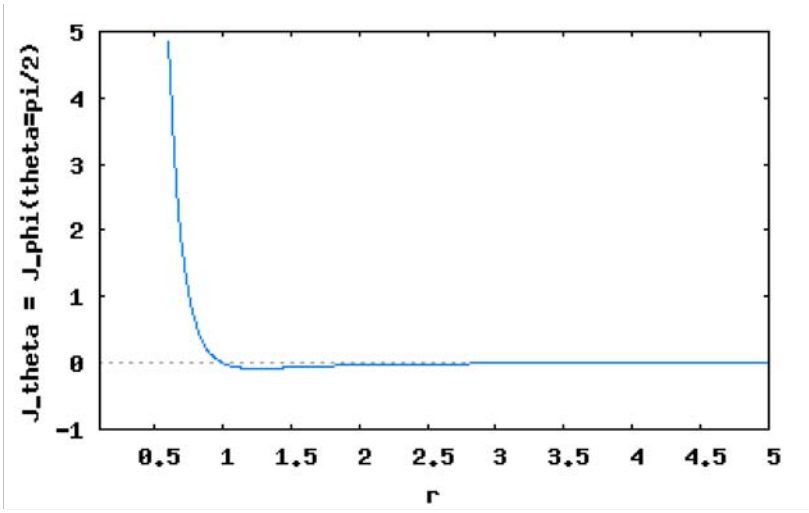


(%i69)

```
wxplot2d([Jtheta_p], [r,.1,5],[y,-1,5], [gnuplot_preamble, "set zeroaxis;"],
[xlabel, "r"], [ylabel, "J_theta = J_phi(theta=pi/2)"])$
```

Output file "C:/Documents and Settings/Administrator/maxout.png".

(%t69)



(%i70)