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(%i1) kill(all);
(%o0) done
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(%i1) assume(drdr>0, r>0, m>0, M>0, G>0, omega>0);
(%o1) [drdr>0, r>0, m>0, M>0, G>0, ω>0]
```

eq. (4)

```
(%i2) F[vac]: 1/6*drdr*del2F;
(%o2) 
$$\frac{\text{del2F drdr}}{6}$$

```

eq. (5)

```
(%i3) E5: F[vac]^2 = m^2*Omega_0^4*drdr;
(%o3) 
$$\frac{\text{del2F}^2 \text{ drdr}^2}{36} = \Omega_0^4 \text{ drdr } m^2$$

```

```
(%i4) E8: solve(E5, Omega_0^4);
(%o4) [  $\Omega_0^4 = \frac{\text{del2F}^2 \text{ drdr}}{36 m^2}$  ]
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```
(%i5) E9: Omega_0^2 = sqrt(rhs(first(E8)));
(%o5) 
$$\Omega_0^2 = \frac{|\text{del2F}| \sqrt{\text{drdr}}}{6 m}$$

```

eqs. (10/9)

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(%i6) del2F: 4*m*M*G/r^4;
(%o6) 
$$\frac{4 G M m}{r^4}$$

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```
(%i7) ev(E9);
(%o7) 
$$\Omega_0^2 = \frac{2 G M \sqrt{\text{drdr}}}{3 r^4}$$

```

eq. (12)

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(%i8) E12: omega^2*phi^2 = 1/36*drdr^2*del2F^2;
(%o8) 
$$\omega^2 \varphi^2 = \frac{4 G^2 M^2 \text{ drdr}^2 m^2}{9 r^8}$$

```

eqs. (13/14)

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(%i9) phi: -m*M*G/r;
(%o9) 
$$-\frac{G M m}{r}$$

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(%i10) E13: ev(E12);
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$$\text{(%o10) } \frac{G^2 M^2 m^2 \omega^2}{r^2} = \frac{4 G^2 M^2 drdr^2 m^2}{9 r^8}$$

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(%i11) E13a: solve(E13, omega^2);
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$$\text{(%o11) } \left[ \omega^2 = \frac{4 drdr^2}{9 r^6} \right]$$

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(%i12) E14: sqrt(first(E13a));
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$$\text{(%o12) } \omega = \frac{2 drdr}{3 r^3}$$

eq. (15)

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(%i13) solve(E14, drdr);
```

$$\text{(%o13) } \left[ drdr = \frac{3 \omega r^3}{2} \right]$$