

1) 187(5): Suggested Metric Function

It is known that the following choice of metric is accurate for the solar system:

$$e^{2\alpha(r,t)} = 1 - \frac{r_0}{r} \quad - (1)$$

$$e^{-2\beta(r,t)} = \left(1 - \frac{r_0}{r}\right)^{-1} \quad - (2)$$

so a small perturbing function could be added to it:

$$e^{2\alpha(r,t)} = 1 - \frac{r_0}{r} + f(r) \quad - (3)$$

$$\alpha(r,t) = \frac{1}{2} \log_e \left(1 - \frac{r_0}{r} + f(r)\right) \quad - (4)$$

The constraint is then:

$$\frac{d^2 \alpha}{dr^2} = 0 \quad - (5)$$

$$\text{i.e.} \quad \frac{d^2}{dr^2} \left[\log_e \left(1 - \frac{r_0}{r} + f(r)\right) \right] = 0 \quad - (6)$$

This may vanish in a limit such as

$$r_0 \ll r$$

as may be used to study the limiting behaviour of $f(r)$. Similar studies were carried out in LFT 108.
