207(5): Meaning of the Third and Fourth Equations of the Evans Orbital Identity

These equations are:

$$D_1 T^1{}_{12} = R^1{}_{112} \quad -(1)$$

i.e.

$$\left(r\left(\frac{\partial f}{\partial r} + 1 + f\right)\frac{\partial f}{\partial \theta} - r(1+f)\frac{\partial}{\partial r}\frac{\partial f}{\partial \theta} \right) = 0$$

or

$$\left(r\left(\frac{\partial f}{\partial r} + f + 1\right) - r\left(1+f\right)\frac{\partial}{\partial r}\right)\frac{\partial f}{\partial \theta} = 0 \quad -(2)$$

and

$$D_2 T^1{}_{21} = R^1{}_{221} \quad -(3)$$

i.e.

$$6(1+f)\frac{\partial^2 f}{\partial \theta^2} = 5\left(\frac{\partial f}{\partial \theta}\right)^2 \quad -(3)$$

where

$$f = r^2\left(\frac{d\theta}{dr}\right)^2 \quad -(4)$$

These equations are true if:

$$\frac{\partial f}{\partial \theta} = 0. \quad -(5)$$

Now note that:

2)

$$\frac{df}{d\theta} = \frac{\partial f}{\partial \theta} + \frac{\partial f}{\partial t}\frac{dt}{d\theta} \quad -(6)$$

so eq. (5) means:

$$\frac{df}{d\theta} = \frac{\partial f}{\partial t}\frac{dt}{d\theta} \quad -(7)$$

i.e.

$$\frac{\partial f}{\partial t} = \frac{df}{d\theta}\frac{d\theta}{dt} = \frac{df}{dt} \quad -(8)$$

This means:

$$f = f(t) \quad -(9)$$

which is always true, QED.

It has been proven that all four of the Evans orbital identities are true, and that the code is self consistent.