* Corrections

A5) Applying Laplace transform to linearised system

$$\textcircled{1} \quad s\bar{Z}_1 = \bar{Z}_2$$
$$\textcircled{2} \quad s\bar{Z}_2 = a_1\bar{Z}_3 + a_2\bar{Z}_1 - a_3\bar{Z}_2$$
$$\textcircled{3} \quad s\bar{Z}_3 = a_4\bar{V} - a_4R\bar{Z}_3$$

① into → ②

$$s(s\bar{Z}_1) = a_1\bar{Z}_3 + a_2\bar{Z}_1 - a_3(s\bar{Z}_1)$$
$$s^2\bar{Z}_1 + s a_3\bar{Z}_1 - a_2\bar{Z}_1 = a_1\bar{Z}_3$$
$$\bar{Z}_3 = \frac{\bar{Z}_1(s^2 + a_3 s - a_2)}{a_1} \quad \textcircled{4}$$

$$s\bar{Z}_3 + a_4R\bar{Z}_3 = a_4\bar{V}$$
$$\bar{Z}_3(s + a_4R) = a_4\bar{V} \qquad \text{Inserting } \textcircled{4}$$

$$\frac{\bar{Z}_1(s^2 + a_3 s - a_2)(s + a_4R)}{a_1} = a_4\bar{V}$$

$$\therefore \frac{\bar{Z}_1}{\bar{V}} = \frac{a_1 a_4}{(s + a_4R)(s^2 + a_3 s - a_2)} = G_x$$

... decomposed Functions.

$$G_x = \frac{a_1 a_4}{(s + a_4R)(s^2 + a_3 s - a_2)} = a_1 a_4 \cdot \left(\frac{1}{(s + a_4R)}\right)\left(\frac{1}{s^2 + a_3 s - a_2}\right)$$

Mapping the second-order TF component to its co-efficients

~~Resolving to general form.~~

$\tau^2 = 1$

$\tau = 1$

$2\zeta\tau = a_3$

$2\zeta = a_3$

$$\zeta = \frac{5b}{7m} \times \frac{1}{2}$$

$$= \frac{5b}{14m}$$

~~Present oscillations providing that~~

The system would present oscillations .. ~~from~~ an impulse response providing that

$$0 < \frac{5b}{14m} < 1$$