The Matlab *rlocus* function assumes that your CLTF characteristic equation has been expressed in the form:

$$1+\alpha T(s)=0$$

where α is the parameter being varied, and *T(s)* is whatever forms the remainder in the characteristic equation.

Let's say, for example, that $GH(s)=\dfrac{23(s+8)}{(0.2s+1)(0.7s+1)}$ and it is in series with a gain factor *K*. We wish to plot the root locus diagram where *K* is the parameter to be varied.

The CLTF will be $\dfrac{KG}{1+KGH}$, and so the characteristic equation of the CLTF will be

$$1+KGH(s)=0$$

The function *rlocus* will vary α (*K* in our case) between $0 < K < \infty$ to produce its result. The user needs to define the function *T(s)* (in our case *GH(s)*). So…

$$GH(s)=\frac{23(s+8)}{(0.2s+1)(0.7s+1)}=\frac{23s+184}{0.14s^2+0.9s+1} \qquad \text{or…..}$$

$$GH(s)=\frac{23(s+8)}{0.2\left(s+\dfrac{1}{0.2}\right)0.7\left(s+\dfrac{1}{0.7}\right)}$$

$$=\frac{164.29(s+8)}{(s+5)(s+1.4286)}$$

```
>> sys_GH = tf([23 184],[0.14 0.9 1])          or…..

>> sys_GH = zpk([-8],[-5 -1.4286],[164.29])

>> rlocus(sys_GH)
```