



**Simple chain guide – chain length change with suspension movement causing crank/pedal feedback/rotation**

Crank rotates (in radians):  $dL / r_{Crank}$

where

$$dL = dLW + dL_1 + dL_2 + dL_{Arc} + dL_{\alpha_1} + dL_{\alpha_2}$$

where

$dLW$ : chain moves backwards as rear wheel moves back by axle path, so rotates backwards.  $dLW = dW * r_{RearCogs} = dX / r_{Wheel} * r_{RearCogs}$

$dL_1, dL_2$  : chain length change between tangent points of chain on cogs

$dL_{Arc}$  : chain's length laying on chain guide changes as angles change

$dL_{\alpha}$  : chain laying on/off cogs make a change in length if cog numbers differ

$$dL_{\alpha_1} = d\alpha_1 * r_{CG} = dA_1 * ( r_{RearCogs} / r_{CG} - 1 ) * r_{CG}$$

$$dL_{\alpha_2} = d\alpha_2 * r_{Crank} = dA_2 * ( r_{CG} / r_{Crank} - 1 ) * r_{Crank}$$

*Note: If chain guide roller is above the chain,  $dL_{\alpha}$  is calculated differently.*