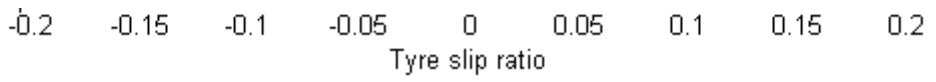

Camber Effects

Once the complex challenges of the slip behaviour of the tyre are tackled the remaining effects are more straightforward. Camber forces are generated using a simple camber thrust model, in which:

$$F_{y,\text{camber}} = \left(F_{y,\text{camber}=0} - \frac{dF_y}{da_{\text{camber}}} a_{\text{camber}} \right) |F_z|$$

As you can see, this models the camber forces as being proportional to F_z, including the residual side force at zero camber.

Rolling Resistance

Rolling resistance in tyres is the moment about the wheel centre line required to rotate the tyre under load, in the absence of any slip forces. Relatively straightforward analysis will demonstrate that this force should be proportional to the difference between the *loaded radius* (distance between wheel centre line and the ground) and the *effective rolling radius* (the belt length of the tyre).

$$M_{y,\text{rolling}} = K_r \left(R_{\text{effroll}} - R_{\text{loaded}} \right) \left(R_{\text{speed}} n + R_{\text{const}} \right)$$

Users may change the parameter **kRollingResistance**, **rSpeed** (default = 1/300) and **rConst** (default = 0) to alter rolling resistance to suit their tyres. An alternative Pacejka rolling resistance equation is available:

$$M_{y,\text{rolling}} = R_0 F_{z0} \lambda_{My} \left(Q_{\text{SY1}} + Q_{\text{SY2}} \frac{F_x}{F_{\text{z0}}} + Q_{\text{SY3}} \frac{V_x}{V_{\text{Ref}}} + Q_{\text{SY4}} \left(\frac{V_x}{V_{\text{Ref}}} \right)^4 + Q_{\text{SY5}} \gamma^2 + Q_{\text{SY6}} \frac{F_z}{F_{z0}} \gamma^2 \right) \left(\left(\frac{F_z}{F_{z0}} \right)^{Q_{\text{SY7}}} \left(\frac{V_x}{V_{Ref}} \right)^{Q_{\text{SY8}}} \right)$$

Note that this is the extended version from Pacejka 6.1; the version from 5.2 is recovered if the following values are chosen for the last four coefficients:

$$Q_{\text{SY5}} = 0; Q_{\text{SY6}} = 0; Q_{\text{SY7}} = 1; Q_{\text{SY8}} = 0$$

Tyre Wear Optimisation

By enabling ETyreWearLimit it is possible to run a sweep limiting tyre wear energy. The example below sweeps from unrestricted down to 1.5MJ at the rear. This makes it easy to identify where the driver should be targeting tyre saving and provides clear trends for laptime versus tyre energy. If you know you're going to have to save tyres, you can set a tyre energy target, and improve your car setup with that limit imposed. This will enable you to find a car that will drive faster while looking after the tyres.