Brakes

Brake torque is generated according to the following equation:

$$M_{\text{brake}} = p_b \mu_{\text{pad}} A_{\text{pistons}} r_{\text{pad}}.$$

To avoid unrealistically high brake pressure for cars with high downforce, total brake pressure is limited by pBrakeTotalMax which can be found in the control section.

Finally, the user also has control over the brake balance. This is described in the control section.

To summarize, the following parameters control brake behaviour:

Parameter	Definition
rBrakeDiscF	The radius of the front brake discs where the brake force is assumed to act.
muBrakesF	The coefficient of friction of the front brakes.
ABrakeCaliperF	The sum of the piston area on the inboard and outboard side of a single front caliper.
rBrakeDiscR	The radius of the rear brake discs where the brake force is assumed to act.
muBrakesR	The coefficient of friction of the rear brakes.
ABrakeCaliperR	The sum of the piston area on the inboard and outboard side of a single rear caliper.

Brake Thermal

As a subset of the tyre thermal model, the brake thermal model can run standalone and have an effect on μ. There is a flag **bIncludeBrakeThermal** which specifies whether the brake thermal model should be run in Dynamic Lap. Brake temperatures can also be emulated in Thermal Replay which can be used for running explorations of brake thermal parameters to correlate the model.

Parameter	Definition
kThermalConductivityToWheel	Thermal conductivity between the brake and the wheel.
rViewFactorToWheel	Proportion of radiative heat transfer from brake to wheel, with rest staying in the brake.
eEmissivity	Emissivity of the brake disc.
vAirBasis	Data abscissae for the lookup between free-stream airspeed and convective cooling coefficient.
kConvectiveCooling	Lookup table data for the convective cooling coefficient.
mBrakeAssembly	Mass of the brake assembly.
pSpecificHeat	Specific heat capacity of brake assembly.
ABrake	Effective area of the brake use for radiation and convetive cooling.

If a wheel thermal model is not defined then *TWheel* is set equal to *TAir*.

Brake μ can then be set as constant, a lookup depending on temperature, or a 2D lookup of temperature and *pBrake (Bar)* * *nWheel(rad/s)*. Inkeeping with our SI convention, temperature is in Kelvins.