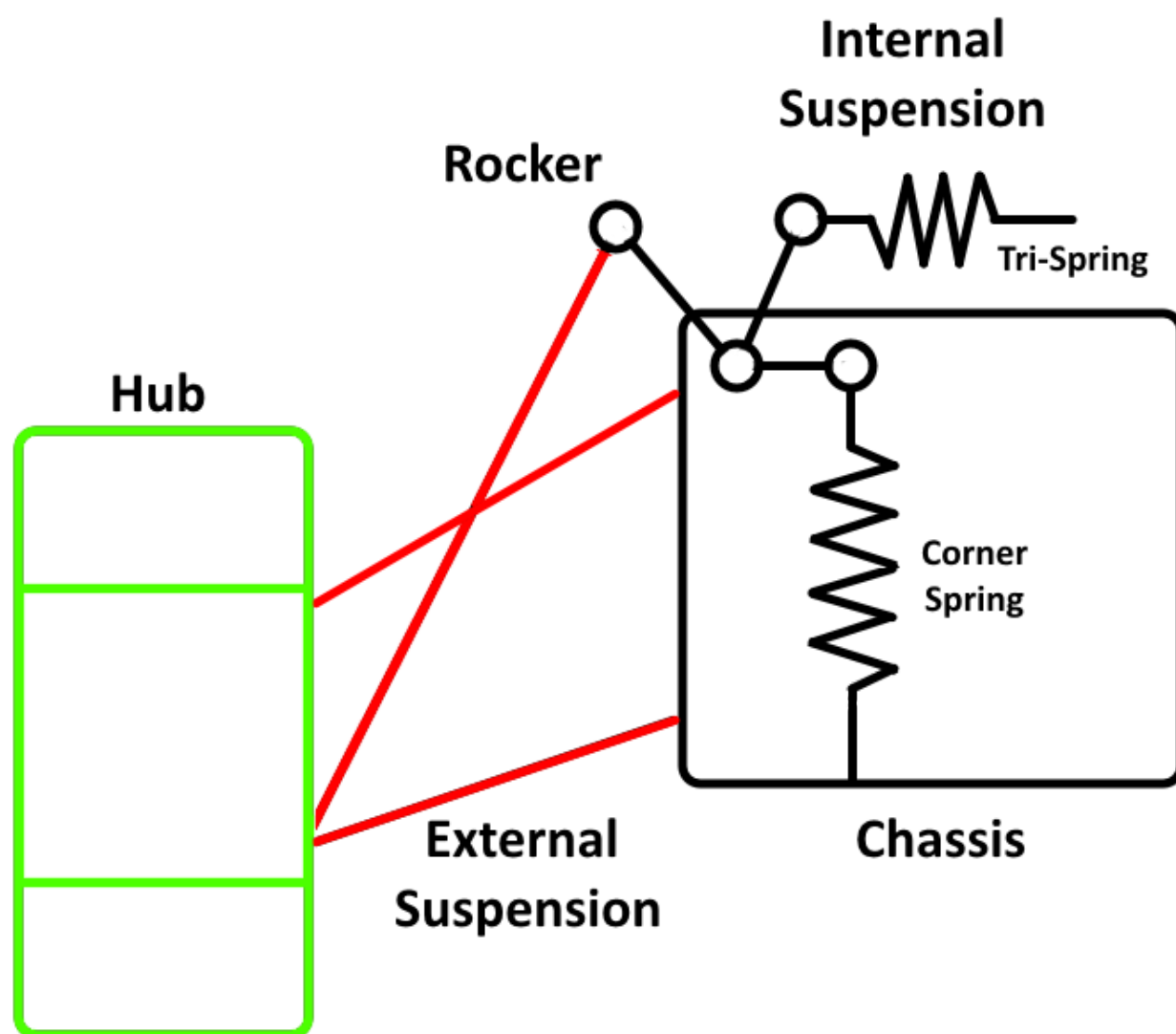


Suspension

The suspension comprises two parts:

1. **External Suspension:** A set of six suspension members connecting the hub to the chassis body. The movement of the external suspension is governed by the position of the *rocker*, which is connected to the hub by the *pushrod*.
2. **Internal Suspension:** The *rocker* is a *bellcrank* (connected to the external suspension via the *pushrod*) which changes the length of a set of internal suspension components as it rotates. This displacement generates restoring forces enabling the car to support its weight and other loads.

A key feature of both the internal and external suspension is that the relationships between hub movement, rocker angle and internal suspension displacements are all non-linear. Capturing this non-linearity is critically important to simulation realism. Canopy Simulations perform a rapid, high-fidelity analysis of both internal and external suspension, before abstracting the non-linear behaviour to a compact mathematical representation which captures the suspension behaviour to a high degree of accuracy.



It is worth noting that while the Canopy model splits the suspension into the internal and external suspension, this does not present barriers for simulating cars which attach the force generating components directly to the external suspension (typically the hub). If your suspension falls into this category then please contact us to discuss your requirements.

The Design Position

Because the suspension moves relative to the chassis, some arbitrary position of the hub relative to the chassis must be chosen in which to write down the positions of all of the suspension members. This position is referred to as the *design position*. There is nothing special about this position in terms of car dynamics, it is not necessarily the position in which the suspension supports the weight of the car, nor the position at which the suspension rests when freely hanging. In order to achieve the ride-heights specified in $Car \rightarrow Chassis \rightarrow hRideF/RSetup$, the setup code will adjust the length of the pushrod, or the springs (according to the user's choice) such that the suspension supports the weight of the car at the specified ride height. The rocker angles and values of x-bump etc. are measured relative to the design position. In other words, the design position is the position at which $aRocker = 0$.

External Suspension

Geometry

When referring to the external suspension, we are really referring to how the hub moves relative to the chassis; this is constrained by the

