

Simulation Types

The Canopy Platform allows users to run several types of simulation. Each simulation type has its own particular uses and limitations; on this page we will explain what each simulation type does and what its uses and limitations are:

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Straight Sim

Straight Sim is a straight-line simulation which finds the static equilibrium state (with no acceleration) of the car at a series of speeds from 0 to 100m/s. It is incredibly fast to run and is run by default when any other simulation type is run, and when the 'Validate Car' button is clicked in the car editor page.

Results

Several vector results are returned from Straight Sim, each one giving values for every speed from 0 to 100m/s. Scalar results are also returned for selected speeds, such as 100, 200, and 300kph, and for maximum speed, which itself is a scalar result!

Strengths

Runs incredibly fast and returns very useful setup information such as ride heights at various speeds, aero and mechanical balances across a range of speeds.

Limitations

There's only so much you can learn about your car by looking at straight line, constant speed equilibria.

Apex Sim

Apex Sim is very similar to Straight Sim except that where Straight Sim finds a true equilibrium for the car in a straight line, Apex Sim finds the *quasi-static* equilibrium of the car at zero throttle (slightly negative gLong) and maximum gLat. In other words it finds the mid-corner condition of the car on the limit of grip for a series of speeds between 10m/s and a few m/s below vMax, which the simulation inherits from Straight Sim.

Results

Exactly as for Straight Sim, but for the mid-corner condition as opposed to straight line.

Strengths

Again, very quick and yields essential setup information such as mid-corner aero and mechanical balances for all corner speeds.

Limitations

It is limited to returning the car state in a single condition.

Limit Sim

Limit Sim shares many characteristics with Apex Sim except that the user can customise the gLat-gLong angle for which *quasi-static* equilibrium is achieved. The user selects an angle in the g-g plane and focus in gLong from which a ray at that angle emanates. The purpose of providing a gFocus option is so that users can better explore the shape of the envelope at high speed, where the majority of the performance envelope is at negative gLong. angleInGGPlane, as illustrated below is defined with zero being pure gLat direction, pi/2 defining straightline acceleration and -pi/2 defining straightline braking. The simulation will sweep from 10m/s to a few m/s below vMax, which the simulation inherits from Straight Sim. At each point along this sweep we determine the edge-of-envelope position along the ray.



