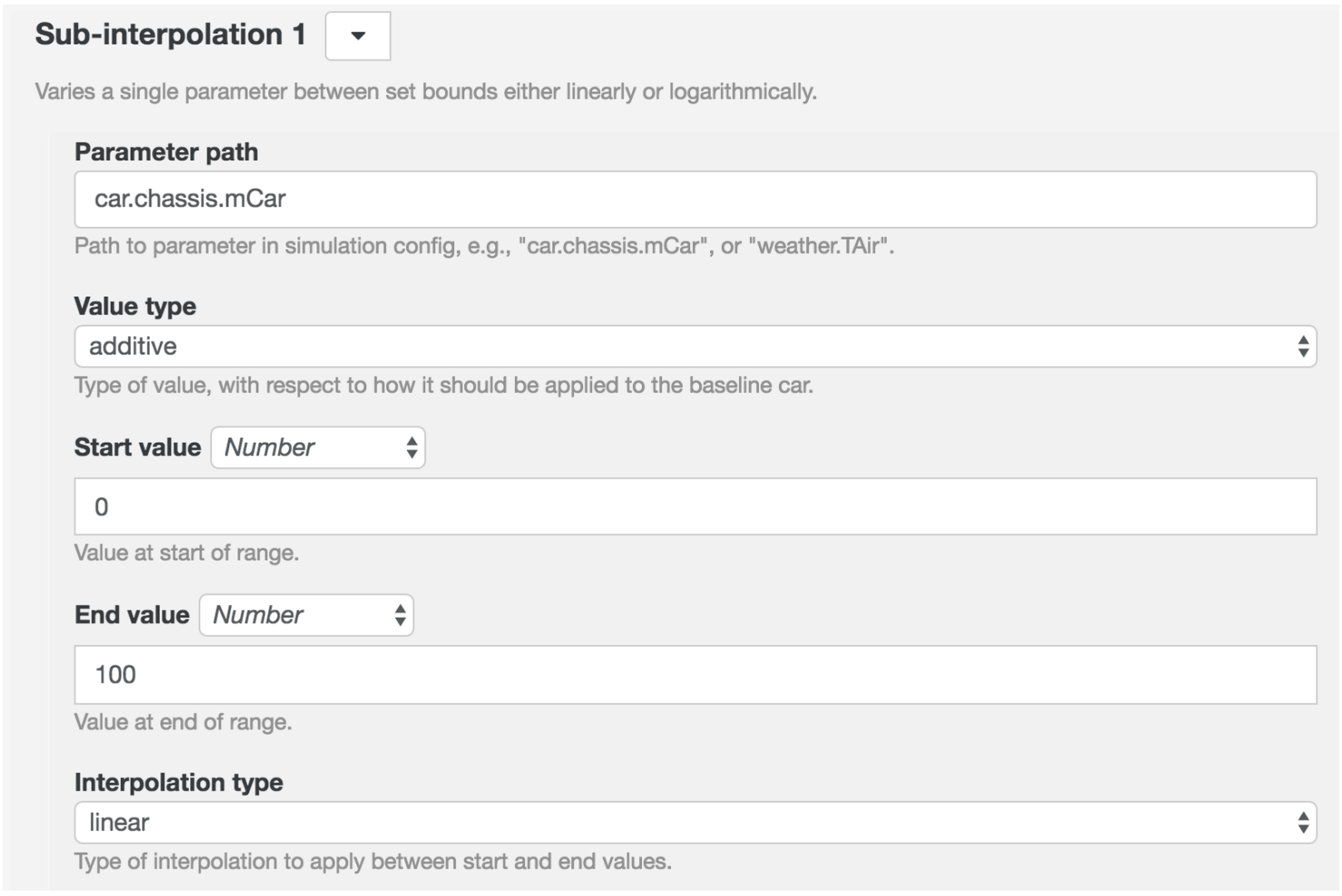
Explorations

Introduction

Explorations lie at the core of the Canopy way of doing simulations. Enabling you to explore the parameter space of your car quickly and easily and in so doing, to find laptime faster than ever before. The way that explorations are configured in the Canopy Platform is very flexible, and therefore very powerful, however it can also be confusing at first glance; this user guide will take you through the different types of explorations and how they are configured, explaining on the way what is meant by *sub-interpolations* and *parallel-sub-sweeps*.

Fundamentals

Explorations define which parameters of your car will be varied in a study and how those parameters will be varied. For example, to run a sweep of fuel mass we would want to run several simulations, each with a different amount of mass added to the mass of the car, increasing from 0kg added at the baseline to 100kg added at the end of the sweep. This is the simplest case of an exploration, we would configure this fuel mass sweep as follows: select *New Exploration*, scroll down to the box marked *Parameter path* and point the exploration towards `car.chassis.mCar` (autocomplete will help you here), select *additive* from the dropdown menu entitled *Value type*, and then enter `0` and `100` in the *Start value* and *End value* boxes respectively. At the end of that you should have an exploration editor that looks like this:



Let's recap what we've done here. The *Parameter path* points to a parameter in the car's parameter tree, this tells the exploration *what to change*. The *Value type* selection tells the exploration *how to apply the changes* in the exploration to the baseline car; by choosing *additive* we've told the exploration to add the values from the exploration definition to the value in the baseline car. We then defined the start and end values, which define the range over which this parameter perturbation will be varied. The final selection which we didn't edit in this case is the *Interpolation type*, which is set to *linear*; this defines how the exploration will vary the value between the start and end values.

Dimensions

The sweep above is the simplest form of *dimension*, a dimension is a collection of one or more *sub-sweeps* which vary parameters in parallel. For instance, if we were being diligent then we should vary centre of gravity height in parallel with car mass if we wish to properly represent the addition of fuel. To do this we click on the + *Sub-interpolation* button below the sweep we've already created, this time targeting `car.chassis.zCoG`. You'll notice that although we can add start and end values etc., we cannot vary the number of points independently for sub-interpolations of a sweep - this is because all sub-interpolations of a sweep must have the same number of points.