DESERT

User Tutorial for the Design Space Exploration Tool (DESERT)

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1.0 Purpose

The Design Space Exploration Tool (DESERT) allows for the use of alternate component configurations, which are best defined as different arrangements of parts. DESERT makes it easier to compare results between designs that have different component configurations. For example, testing how the Mass Spring Damper behaves with a tungsten spring instead of a steel spring only takes a few steps using the DESERT tools. A design space is defined as the realm of design possibilities given a set of constraints. For example, installing special shocks in a car's suspension limits the types of A-arms that can be used. This situation represents a constraint that has been put on the design space. Open META-CyPhy uses the idea of design space to help the user develop the best possible design.

2.0 Procedure: Running the DESERT Simulation

The DESERT simulator is a tool in GME that is able to assemble many different configurations for a given system in a very short amount of time.

To proceed, navigate to the toolbar at the top of the page and **click on the DESERT icon** as shown in Figure 1.

Figure 1: DESERT Icon

The following window, the "Top Design Space Selector" will pop up as shown in Figure 2.

Click on "**NewDC_MyMassSpringDamper (Compound)"** to run DESERT on the full ("Compound") component assembly **(NOT one of its individual components).** If you select one of the individual components, DESERT will only create the configurations for that specific component instead of creating them for the whole system.

Click OK.

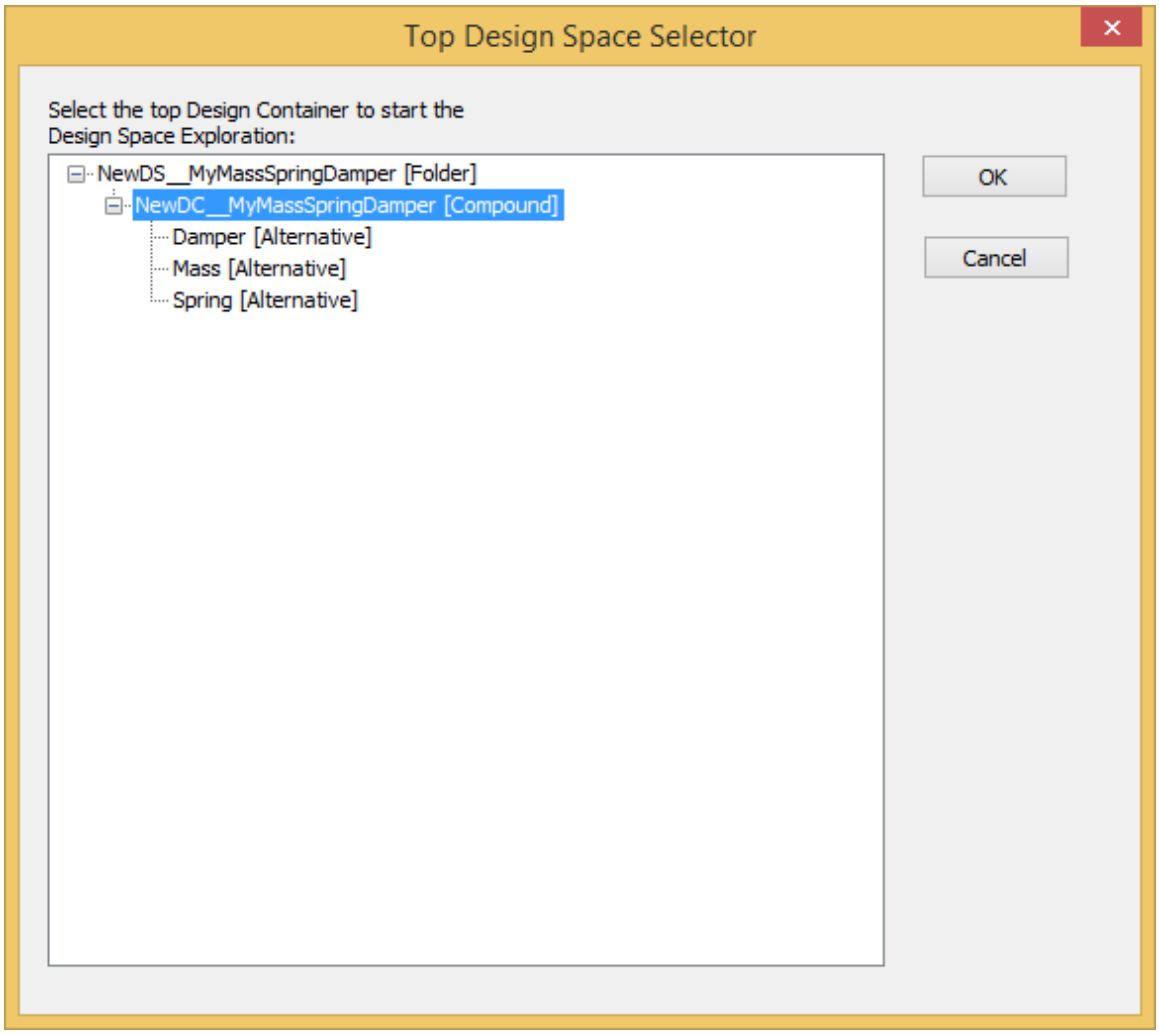

Figure 2: Design Space Selection

This causes the Open META-CyPhy DESERT Tool window to appear, as seen in Figure 3. As you can see, this window contains constraints which you can apply to the system.

Constraints are restrictions on the number of designs that can be made.

NOTE:

- The values used to determine whether a part violates a constraint are based on the parameter values set in the design space.
- "View/Select" can be clicked before clicking "Show Cfgs". This displays all of the available components and can be used to manually decrease the number of configurations which will be tested for compliance with the constraints.

By specifying a model's constraints in the workspace, you can limit the number of potential combinations in which that model can be used. In this tutorial, you will use two types of constraints: *visual* constraints and *property* constraints. Visual constraints filter models based on their shape, and property constraints filter them based on properties of the model such as its mass. For example, you can set a property constraint to set the range for the masses of an engine, and only the configurations within that range will appear.

Click "Apply All," and then click "**Show Cfgs**," or **configurations** (Figure 3).

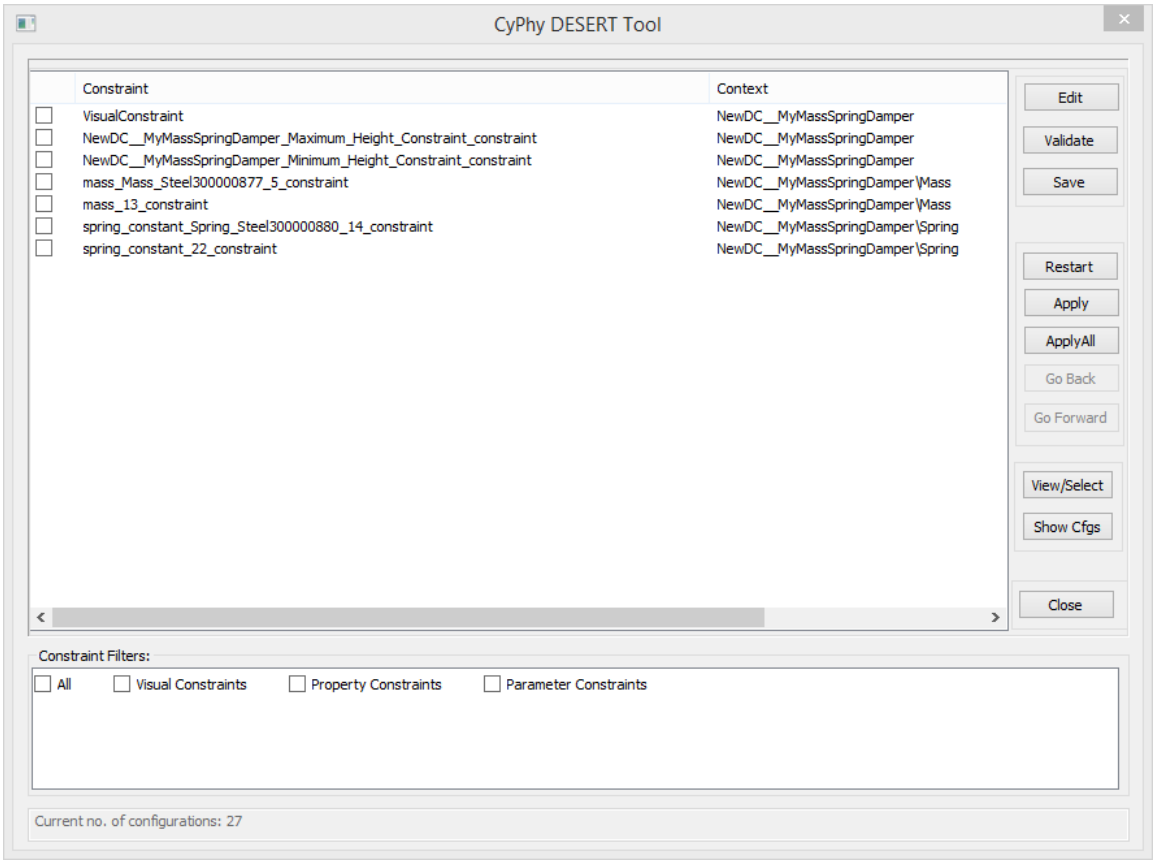

Figure 3: Design Space Constraints

After clicking "Show Cfgs," a window called "Desert Configuration Dialog" will pop up (Figure 4). This window is used to choose which designs to analyze.

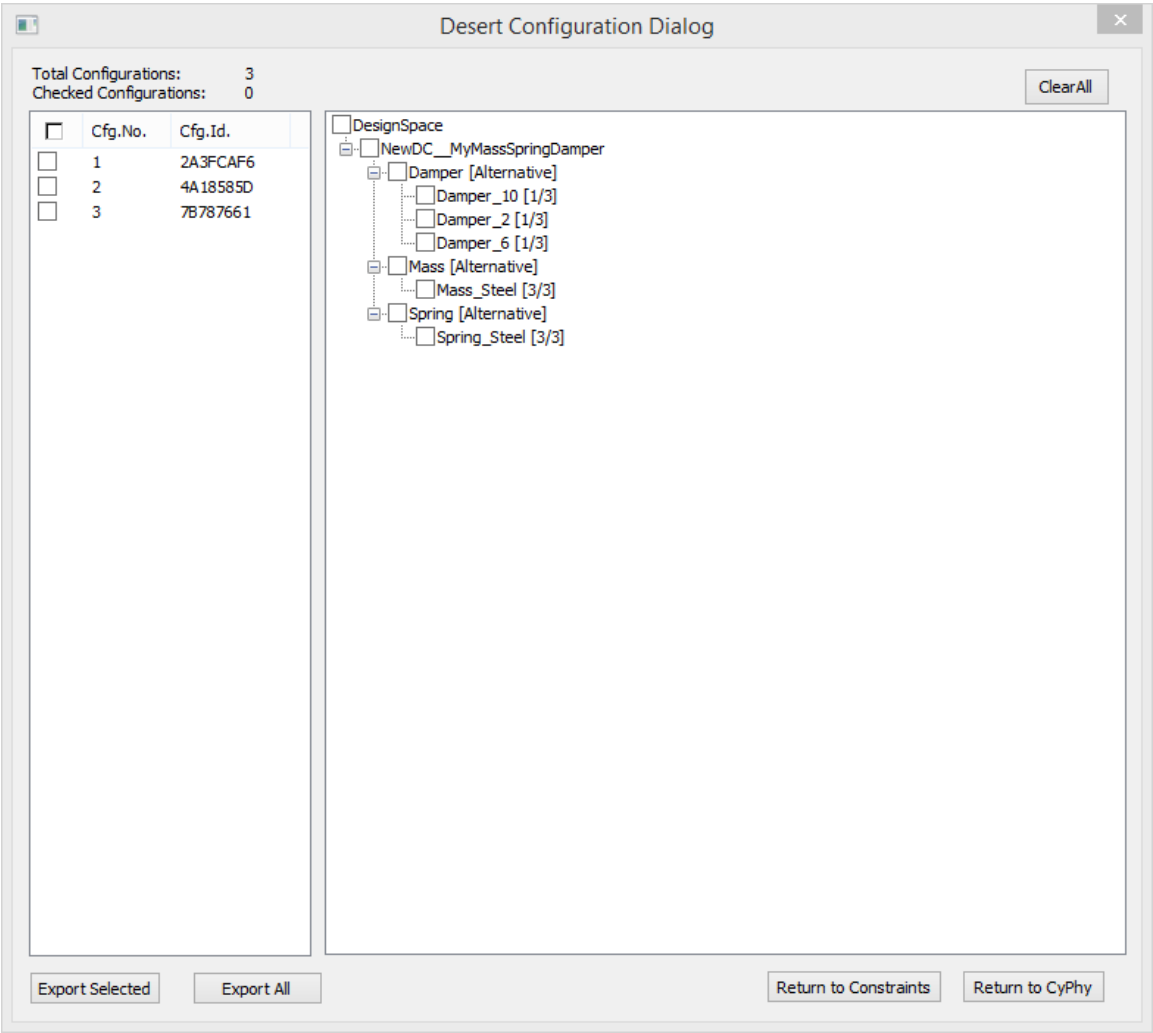

Figure 4: The Desert Configuration Dialog

You can simulate any number of configurations. For the purpose of this demonstration, we will export all of the configurations**. Click "Export All." After the program has finished exporting, close the window/click Return to CyPhy.**

You are now ready to execute a test bench.