ISSUE 65

APOGEE

PEAK OF FLIGHT

NEWSLETTER

Simulating Dual Deployment Rockets in the RockSim Software — Part 2

By Tim Van Milligan

In the last article, I said that RockSim was not capable of simulating dual deployment. Boy was I ever wrong! This is one time when I'm glad I didn't have the facts straight.

RockSim can simulate dual deployment!

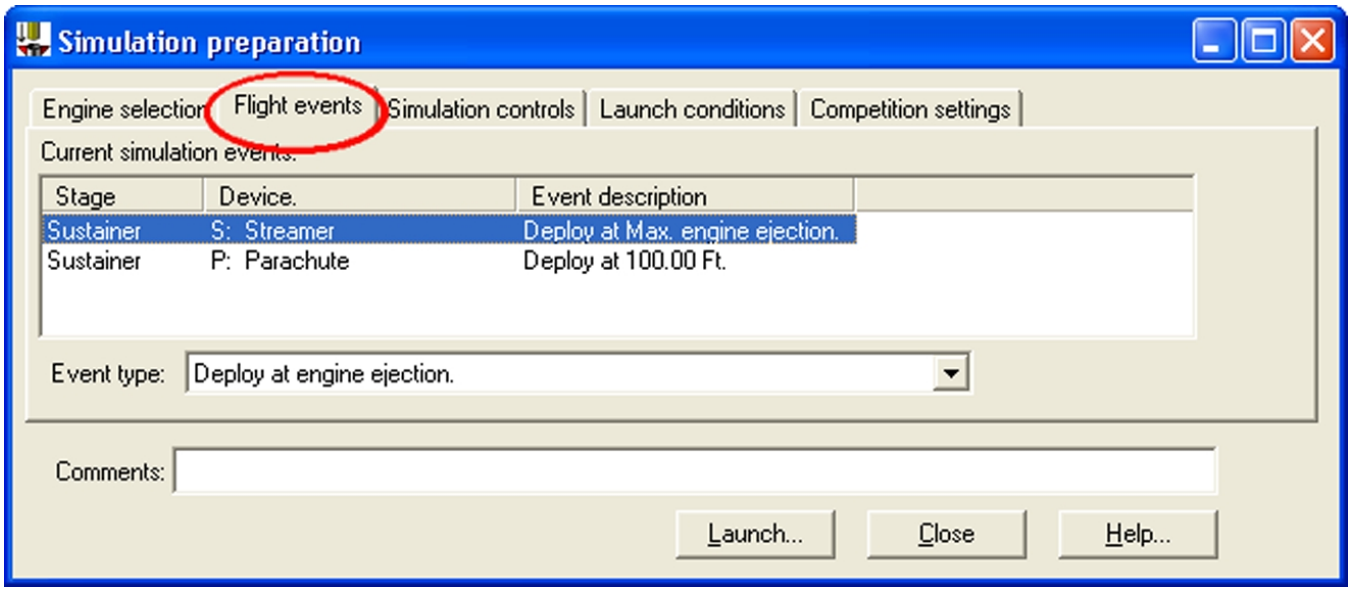
I found out this fact when M. Shane Heilman sent me a .rkt file of a design that he did. In the rocket, Shane had simulated dual deployment using a feature that I didn't realize existed.

I learned that RockSim will display the recovery devices in the simulation preparation area. As you load the motors, you can change when in the flight the parachute deploys. I thought it only handled one recovery device. But actually, it displays all the recovery devices in the rocket, and you can tell RockSim when during the launch to deploy that device. This makes dual-deployment a breeze.

If you have two parachutes in the model, you tell it to deploy the drogue at apogee, and the other at some specified altitude. This is exactly how you'd set up your rocket's electronics anyway.

When you run the simulation, RockSim does exactly what you want it to. It will deploy the recovery devices at the specified times during the flight. So you will be able to see how far downrange the rocket will land.

There are a couple of things I should mention though. First, you should change the names of the recovery devices as you create them. The defaults in RockSim are "streamer" and "parachute." These will be how the information is displayed in the simulation preparation area. So it can be difficult to tell parachutes apart. I suggest naming them "drouge parachute"



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and "main parachute" to make it easy to specify when they are deployed.

After you run the simulation, you should take a look at the 2D flight profile to see if everything looks ok. I personally find that you can learn a lot from watching the flight movie. That is how I discovered the correct way for selecting the right delay for a rocket motor. (see Newsletter 59)

If you have wind in the simulation, you'll see a definite shift in the trajectory after the main parachute deploys. That is what you're looking for to make sure dual deployment is working. Using this, you can also find out how far downrange the rocket will land.

You can also look at the plots of the velocity versus time. It will show the shift in descent speed after the two recovery devices deploy.

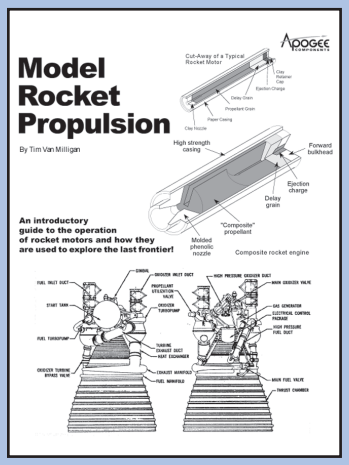
There are still some limitations. RockSim still wants the sustainer to remain as one object. It can't track two descending parts at the same time. So simulating rockets that split up in flight is still difficult to do.

In conclusion, I'm glad that I was wrong about dual deployment simulations. It can be done quickly and easily in RockSim.

About the Author:

Tim Van Milligan is the owner of Apogee Components (http://www.apogeerockets.com) and the curator of the rocketry education web site: http://www.apogeerockets.com/education. He is also the author of the books: "*Model Rocket Design and Construction*," "*69 Simple Science Fair Projects with Model Rockets: Aeronautics*" and publisher of the FREE e-zine newsletter about model rockets. You can subscribe to the e-zine at the Apogee Components web site, or sending an email to: ezine@apogeerockets.com with "SUBSCRIBE" as the subject line of the message.

Want To Learn More About Rocket Propulsion?



Actually, if you fly rockets, you need to know about rocket motors. Because if you choose the wrong rocket engine for your rocket, it will crash. Not only did you waste money on the wrong motor, but you will have destroyed the rocket kit too. That is why you need the knowledge contained in this book; so you can make sure your rocket contains the right motor— which saves you money.

This two-volume publication explains in simple terms how a model rocket motor works. Through many hands-on demonstrations, you'll understand the basic principles of rocket propulsion, and how model rocket motors are similar to the solid rockets used by the Space Shuttle to launch astronauts into orbit. By knowing how a rocket motor operates, you will understand why they are used by NASA to explore space.

Because it is written in a textbook format, if you are a teacher, you will find this book useful for an educational unit on rocketry or space exploration. Besides having 62 crystal-clear illustrations to explain the text, most chapters also contain example questions to test the knowledge gained by the reader.

There are 11 easy to understand chapters: A Brief History of the Rocket, Newton's Laws of Motion, Momentum and Newton's Second Law of Motion, The Thrust Equation, The Operation of the Model Rocket Motor, Model Rocket Motor Classification, Specific Impulse - A measure of a rocket's efficiency, Rocket Motor Examples, Basic Rocket Performance, Multi-Stage Rockets, and Clustered Engine Rockets.

A second, 12 page booklet describes more than 16 different rocket demonstrations that can be performed to provide "hands-on" learning of the basic rocket principles. Also included is a full answer key to all the questions in the main text. Recommended for grades 6 and above.

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