Disclaimer: it has been several years since I used this code. Take everything in this document with a grain of salt. -Jon

Installation

By default, Eve's code needs to run on Python 3.6 and NumPy 1.13 (I think it's the Numpy version that causes most of the issue here). As far as I can tell, when you upgrade to the latest version of Python and NumPy, things that shouldn't be arrays in the code become arrays. You could likely update the code if you want, but I haven't bothered to track the issue down any further.

I recommend using Anaconda or Miniconda to set up a Python environment to run the code.

Code components

There are four pieces of the code that the user interacts with.

Configuration

In the folder "disk_input" you can place a text file that sets the disk/planet/star parameters you want. Some examples are included. Many of the parameters are orbital parameters. You can also control the size distribution of dust grains (that's the "beta…" stuff), where the grains are launched from the parent bodies ("launchstyle"), the number of parent bodies ("Nparticles") and the number of dust grains launched from each parent body ("Nlaunch"). Other parameters should be deducible from the code. The only thing I can't recall is what "sizedistrb" does … something about some orbital correction to the size distribution of dust grains. You will have to ask Eve.

Launching dust grains

The next step is to launch the dust grains. You can do this by going into the "codes" directory and running the command line "python gen_debris_disk.py <config file name>". (Don't include the .txt in the name.) The code will load the config file, generate the parent bodies, and then launch dust grains from each parent body. The dust grain orbits will be saved in the "dustorbit" folder. The name of the file will be the name of the config file with the suffix "_dustorbit".

You can also make a shell script like Eve did to run multiple disk generation jobs in parallel (see make_debris_disks.sh for an example).

Generating the scattered light image

To generate the scattered light image you run in the command line "python save_altaz.py maxa d fstr alt az ar". All the parameters are explained in scatter_image.py, with the exception of fstr,

which is the name of the dust orbit file you want to use to make the scattered light image. Again, you can also put these commands into a shell script (see save_altaz.sh for an example). The image will be saved in the images/imgrid folder. Images will be organized in sub-folders according to resolution. Don't go crazy with the resolution, these files can get pretty big.

In scatter_image.py, there is a boolean at the top of the file called "use_compHG". Make this false if you want the scattering phase function to be normal Henyey-Greenstein and true if you want to use the composite Henyey-Greenstein function. I got the composite function from Hedman&Stark 2015, I believe.

Viewing the image

You can load the image generated by save_altaz.py using Numpy's loadtxt() function. After that, you can use Matplotlib's imshow() to generate a plot. Before making the plot, it might be a good idea to smooth the image. See chk_smooth_image.py for an example.