

Obtain eigenspectra and train the spectral emulator

Modification History:

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START

1. Overview

Once the model grids are obtained, the program computes the so-called eigenspectra, which are the smallest “subset” of model grids that could reconstruct the whole grids, via linear combination at each pixel, within a tolerance level, indicated by “threshold” in “config.yaml”.

In principle, the linear combination of these eigenspectra can “(roughly) reproduce” any spectra in the model grids, if the weights (“linear coefficients”) of eigenspectra are given. We can therefore compute the posterior of weights at each model grid point. In the future, for any given model parameters in between the grids, we can therefore interpolate the weights of eigenspectra and reconstruct our desired model spectra.

So the procedure should be:

- obtain eigenspectra
- calculate the posterior of weights of eigenspectra for each grid point (here each grid point represents a model spectrum)
- ...

2. Obtain eigenspectra

Eigenspectra are obtained via Principal Component Analysis (PCA).

`actpy36`

`pca.py --create`

found 7 components explaining 99.9% of the variance

Shape of PCA components (7, 16384)

Therefore, we’ve obtained 7 eigenspectra representative of our model grid sample.

>>> `plot eigenspectra`

`pca.py --plot=eigenspectra`

The output file is “[plots/eigenspectra.png](#)”.





