Progress Update:

Swapped from running Monte Carlo simulations by m file, to using Matlab's Built in Sensitivity Analyser to run and then analyse the Monte Carlo simulations.

Generated 2 runs, using the GSFR Simulink Model, with 2 thousand and 20 thousand runs each. Used the values from Anderson's Low Order SFR paper as the mean for normal distribution, with a standard deviation of 15%.
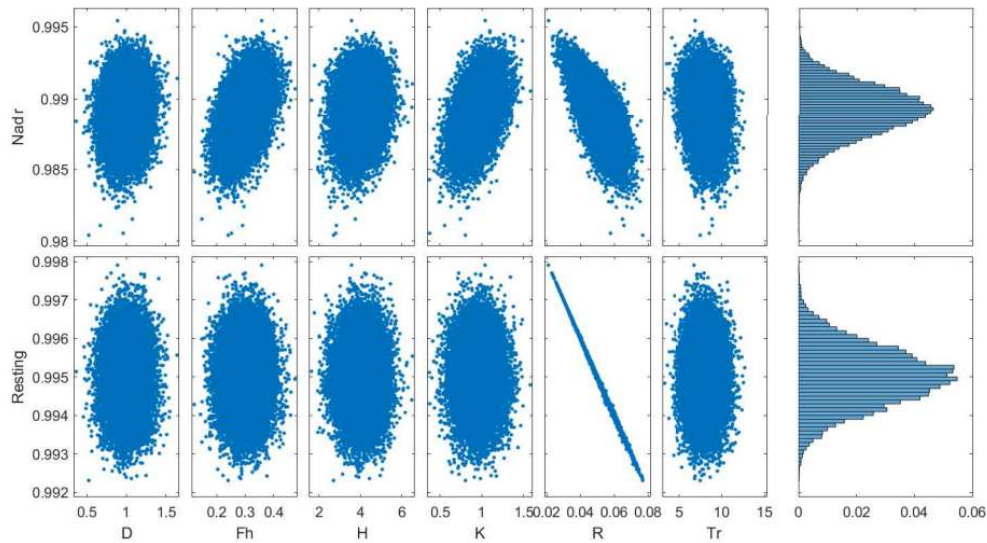
The resulting graphs are as follows:

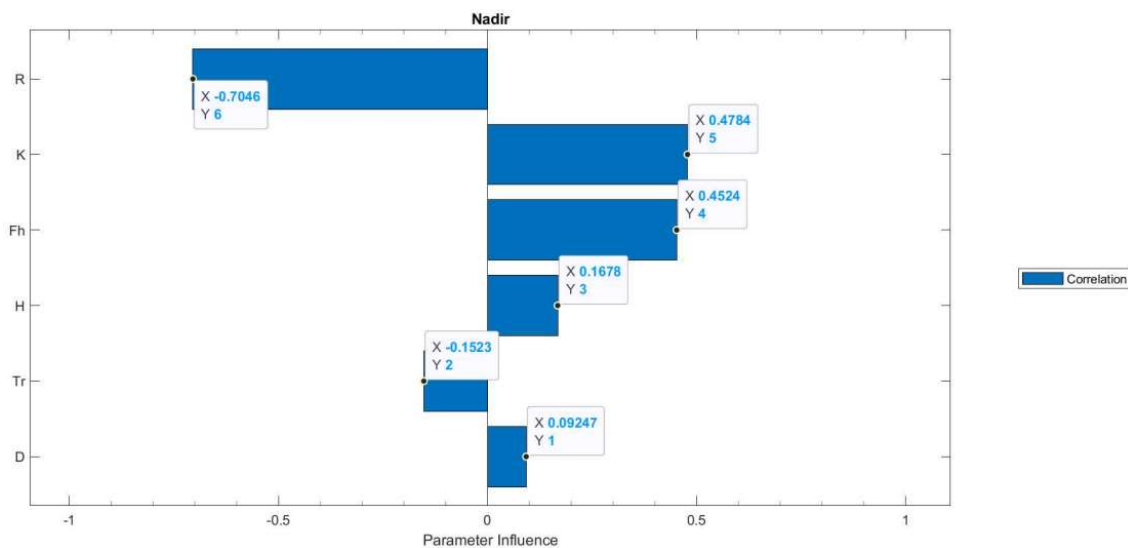*Figure 1: Scatter plot of Variables vs GSFR pu*

Figure 2: Tornado Plot showing Correlation between Variable and Minimizing Depth of Frequency Nadir

As can be seen, Settling (indicated by Resting) frequency is clearly almost entirely defined by R. Frequency Nadir is impacted by each variable, but Inertia is the 3rd least important variable for

determining Frequency Nadir. The next least important variable is almost 3 times more correlated than inertia. R, K, and Fh are more correlated than H.

This indicates to me that it should be easy to compensate for changes in H.

To Do/Next Steps:

I want to try define an acceptable Range for H. I don't know if I can do that with pure values, like saying H should be greater than 2. Instead, I propose I look at how far from the ESTIMATION of H the real system can be, without going over the statutory boundaries, 49.5hz and 50.5 hz. If I do this for a range of "Estimated" values of H, say, 2-10, I could then determine what the safe range of Inaccuracy is. Aka, as long as the "Estimation" of H is within this window of accuracy, eq. +10% -5%, then Jesus' injection will keep the frequency response within the statutory window.

Please tell me if this is not what you intended.

I cannot see a way to just, "define an Acceptable range of H", per our meeting notes, because how each variable has some sort of impact on the Nadir (especially R, K, and Fh). Without setting those 3 as fixed values, I won't be able to get a meaningful range. The range is dependent on the value of the other variables.
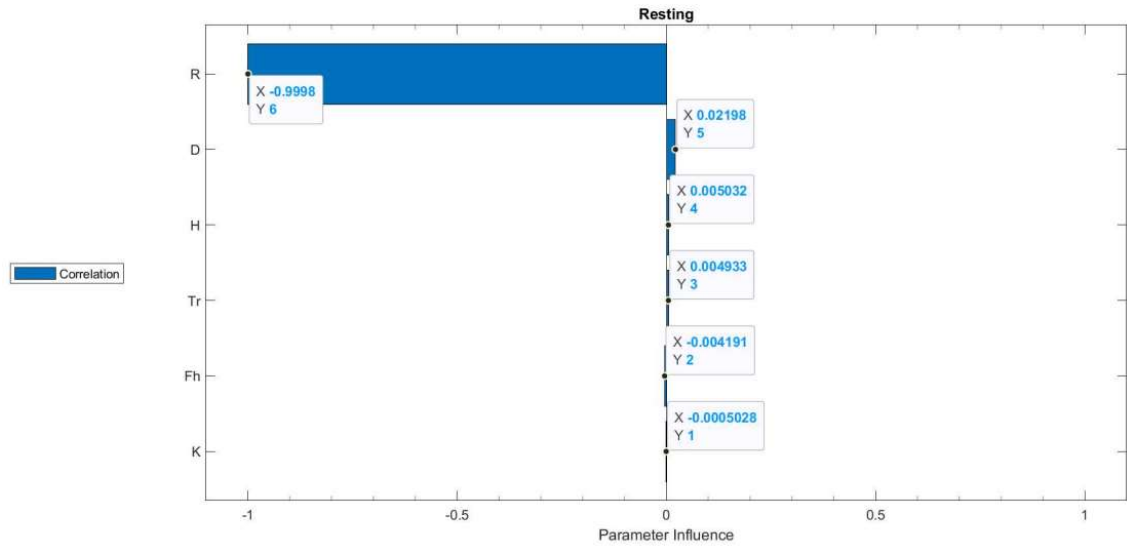
Extra Graph:

Figure 3: Tornado plot of correlation between Variables and Settling Frequency