With size 3Nx1 and 3Nx3N respectively since masses are assigned only at translational dofs

For UMRHA, such that using orthogonality and assuming classical damping,

For a meaningful comparison with SDF system, select a direction, say x,

So that we can use

Such that

So that the SDF systems of interest are

If we select x direction for the moment, we want to develop base shear vs reference node disp so that we can get the SDF system for x direction:

We push with following force distribution:

Recording the x and y components of the base shear and ref node disp and using SRSS to account for the 3D nature of the model, we have the following pushover curve:

**How should we convert such a curve to the desired SDF systematically?**

Because x is the direction selected,

So that

The above boxed expressions provide conversions from the SRSS pushover curve to the SDF system in the desired direction

A similar derivation can be developed for the y direction

As for the initial period of this SDF system prior to yielding,