**Derivation of the adjustment to mole fractions for sensitivity analysis of the physical parameters.**

Goal is to find a value of to give to Cantera, which, when all species mole fractions are renormalized in Cantera, results in a 1% increase in the mole fraction of species i. In general, once the perturbation is made, the sum of mole fractions will not be one and must be renormalized. is the value of the mole fraction of species *i* after Cantera has renormalized. The value is the new parameter we need to find.

Assumption: since all mole fractions in original case should add to 1. Further, this implies that:

So this gives:

Final note: In the MSI code, a is specified, which is typically 1% of the original Therefore, in the MSI code, the final relation is written as:

These expressions are equivalent.