



# Dynamic Species Reduction for Multi-Cycle CFD Simulations

## Goals

Increase computational efficiency of detailed 3D CFD simulations to enable improved multi-cycle simulations of Co-Optima relevant conditions and fuels.

- 1) Dynamic Species Reduction (DSR) to reduce expense during gas exchange (80-90%)
- 2) Product Directed Remapping for multi-zone binning post combustion (50%)

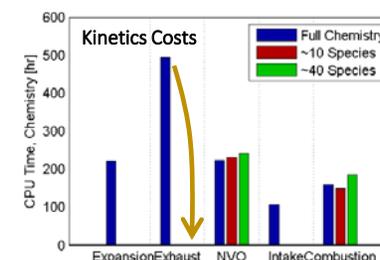
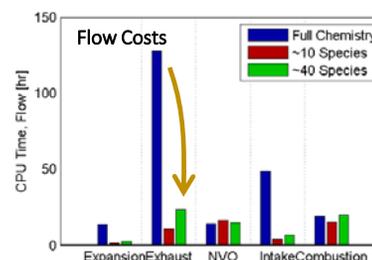
## Approach

- Implement algorithms in Converge by leveraging custom user defined functions.
- Tune and validate model settings based on simulations conducted throughout the overall Co-Optima effort.

## Potential Impact on Co-Optima Goals

Reduced computational cost for simulations will enable the study of cyclic coupling effects that may be critical for ACI engine operation. It will also enable the use of larger and more comprehensive kinetics mechanisms capable of capturing any unique behavior of Co-Optima fuels.

CYCLE	CURRENT SPECIES TREATMENT	PROPOSED SPECIES TREATMENT	ESTIMATED TIME SAVING
COMPRESSION	REACTANT DIRECTED REMAPPING		
COMBUSTION			
EXPANSION	NO REMAPPING	PRODUCT DIRECTED REMAPPING	50 %
GAS EXCHANGE	FROZEN	DYNAMIC SPECIES REDUCTION	90 %
ESTIMATED FULL CYCLE SAVING			80 %



## Team Members

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