

AIRONUM parallel speedup

Stephen Wornom¹

¹ IMAG, Université de Montpellier, France

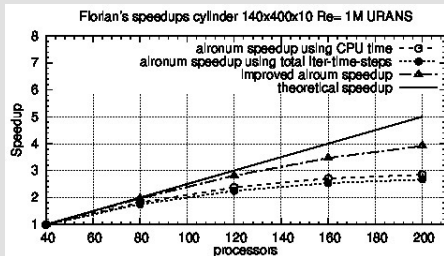
NORMA meeting of June 1, 2022



How to improve AIRONUM Parallel speedup

AIRONUM-Understanding reasons for poor parallel speedup:

- **Global memory arrays are the problem:**
Node Memory = 160 GB
Task Memory avail = 160 GB/ntask
Mem. AIRONUM = global + dyn
OK if $\text{AIRONUM} \leq \text{Mem. avail}$
Global arrays degrades speedups
- **Add NiceFlow and NOISEtte speedups to figure:**
- **Two Methods to improve speedup:**



Method-1: Eliminate global arrays: option in AIRONUM

- Summary Method-1:
 - use GetSolPart.f rather than GetSol.f.
 - use WRTSolPart.f rather than WRTSol.f.
 - GetSol.f and WRTSol.f use global arrays.
 - GetSolPart.f and WRTSolPart.f do NOT use global arrays.
 - Disadvantage: GetSolPart.f and WRTSolPart.f writes 4 files/processor.
 - Disadvantage: 1000 processors = 16000 files/time step saved.
 - Disadvantage: 1000 processors = file management nightmare.
 - Advantage: present method writes 4 files/processor/time step saved.

Method-2: allocate/deallocate global arrays as needed

- Summary Method-2:
 - global arrays are only allocated when needed, then deallocated.
 - ALLOCATE/DEALLOCATE are F90 features, not available when MPI was implemented(F77).
 - Small modification to AIRONUM code
 - validation in progress.