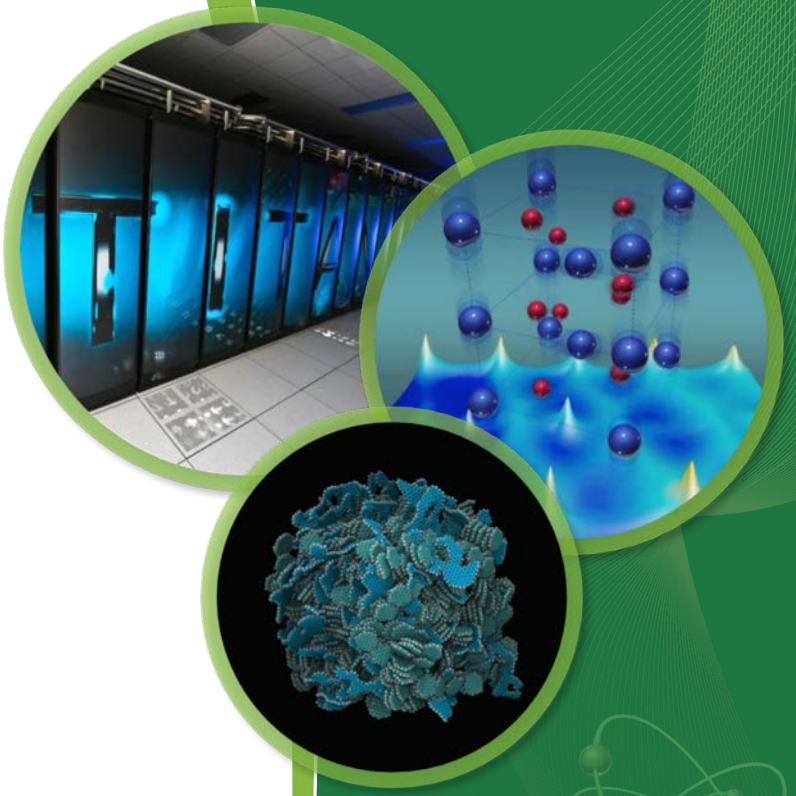
ENDF/B-VIII.0 Testing with AMPX and SCALE



Andrew Holcomb
D. Wiarda
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NCSD 2017 Topical Meeting
Carlsbad, New Mexico
September 10–15, 2017

ORNL is managed by UT-Battelle
for the US Department of Energy

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Outline

1. Brief overview of AMPX
2. Synopsis of VALID
3. ENDF/B-VIII.β4 vs ENDF/B-VII.1 results

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AMPX

- Modular code system that takes basic cross section data in Evaluated Nuclear Data File (ENDF) format to provide:
  - Multigroup (MG) libraries
  - Continuous energy (CE) libraries
  - Cross section uncertainty or covariance data
  - Depletion and decay libraries

- SCALE uses the AMPX processed libraries

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Verified, Archived Library of Inputs and Data (VALID)

- SCALE models for over 400 cases taken from the International Handbook of Evaluated Criticality Safety Benchmark Experiments (IHECSBE), covering:
  - Fast Systems
    - High-enrichment uranium metal (HMF)
    - Intermediate-enrichment metal (IMF)
    - Plutonium metal (PMF)
    - Mixed U/Pu composite (MCF)
  - Thermal Systems
    - High-enrichment uranium solution (HST)
    - Low-enrichment uranium composite (LCT)
    - Low-enrichment uranium solution (LST)
    - Mixed U/Pu composite (MCT)
    - Mixed U/Pu solution (MST)
    - Plutonium solution (PST)

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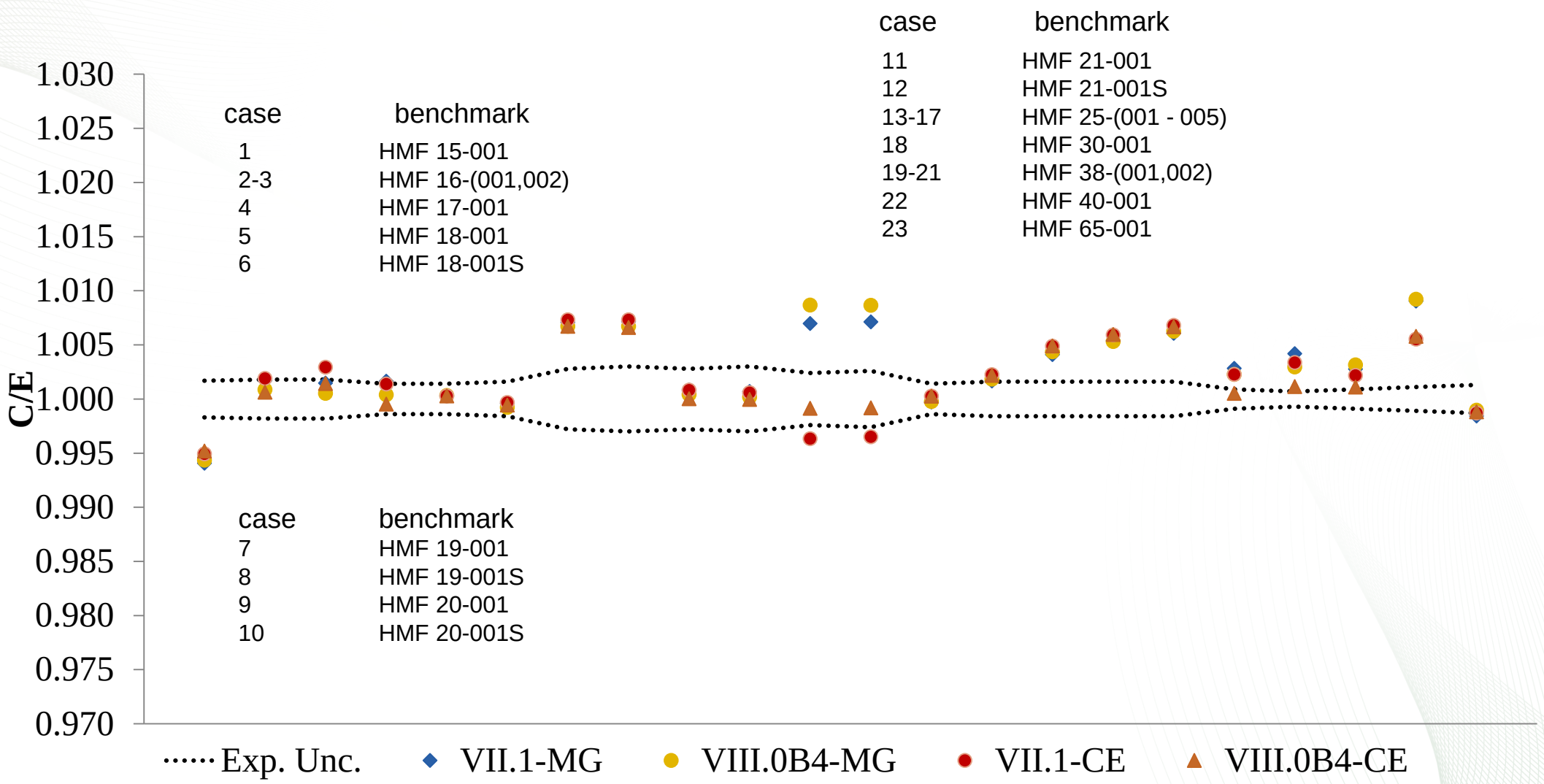
HMF Results



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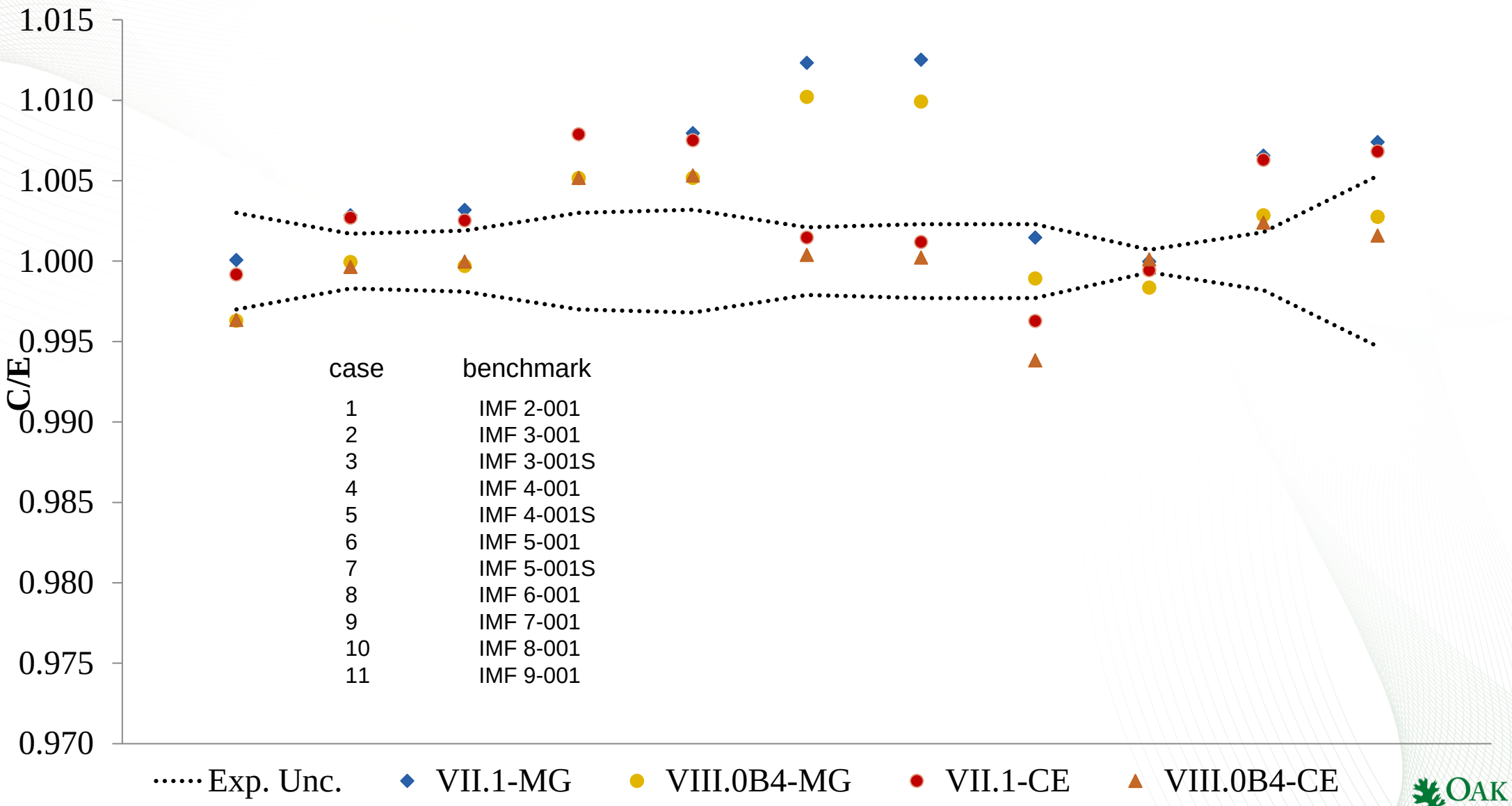
IMF Results



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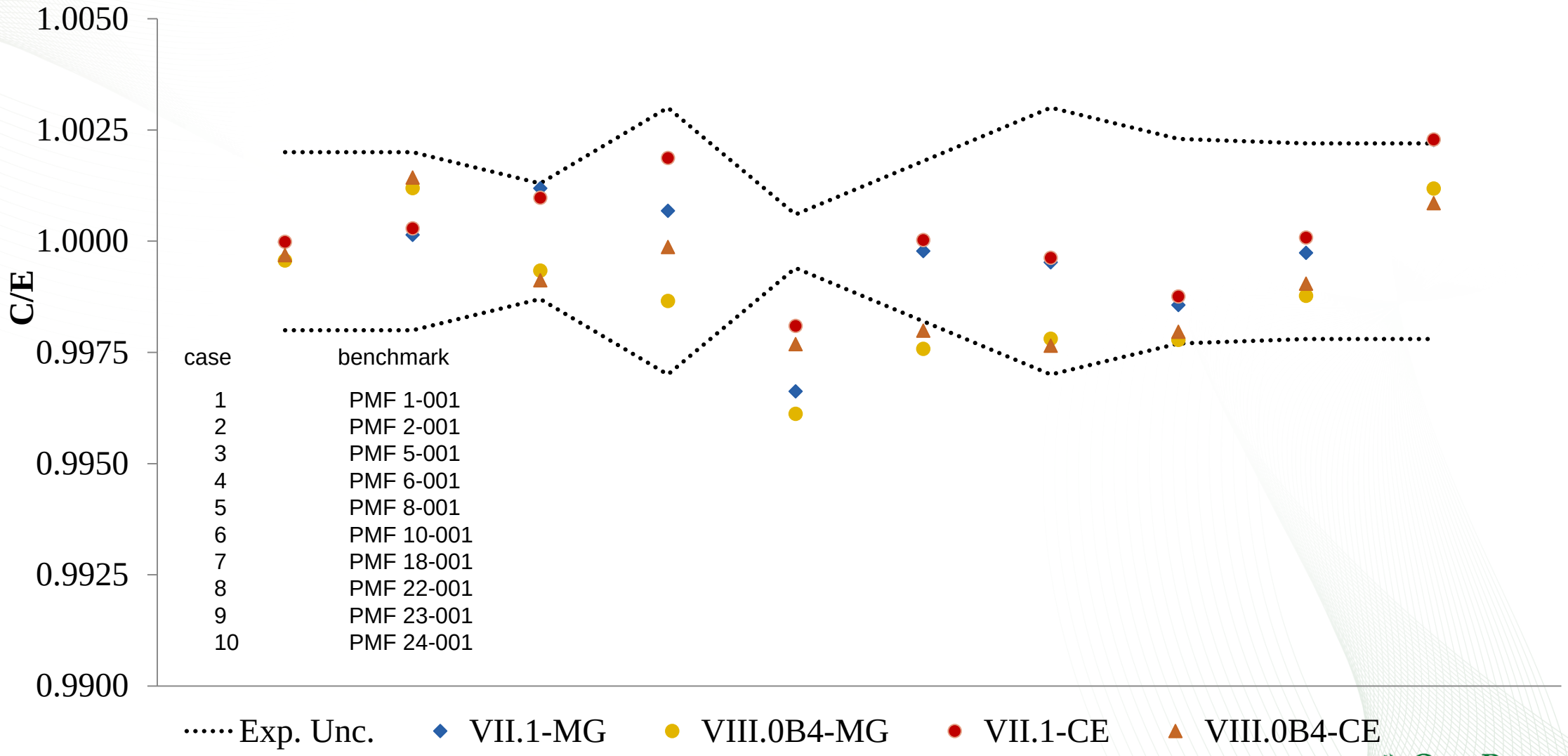
PMF Results



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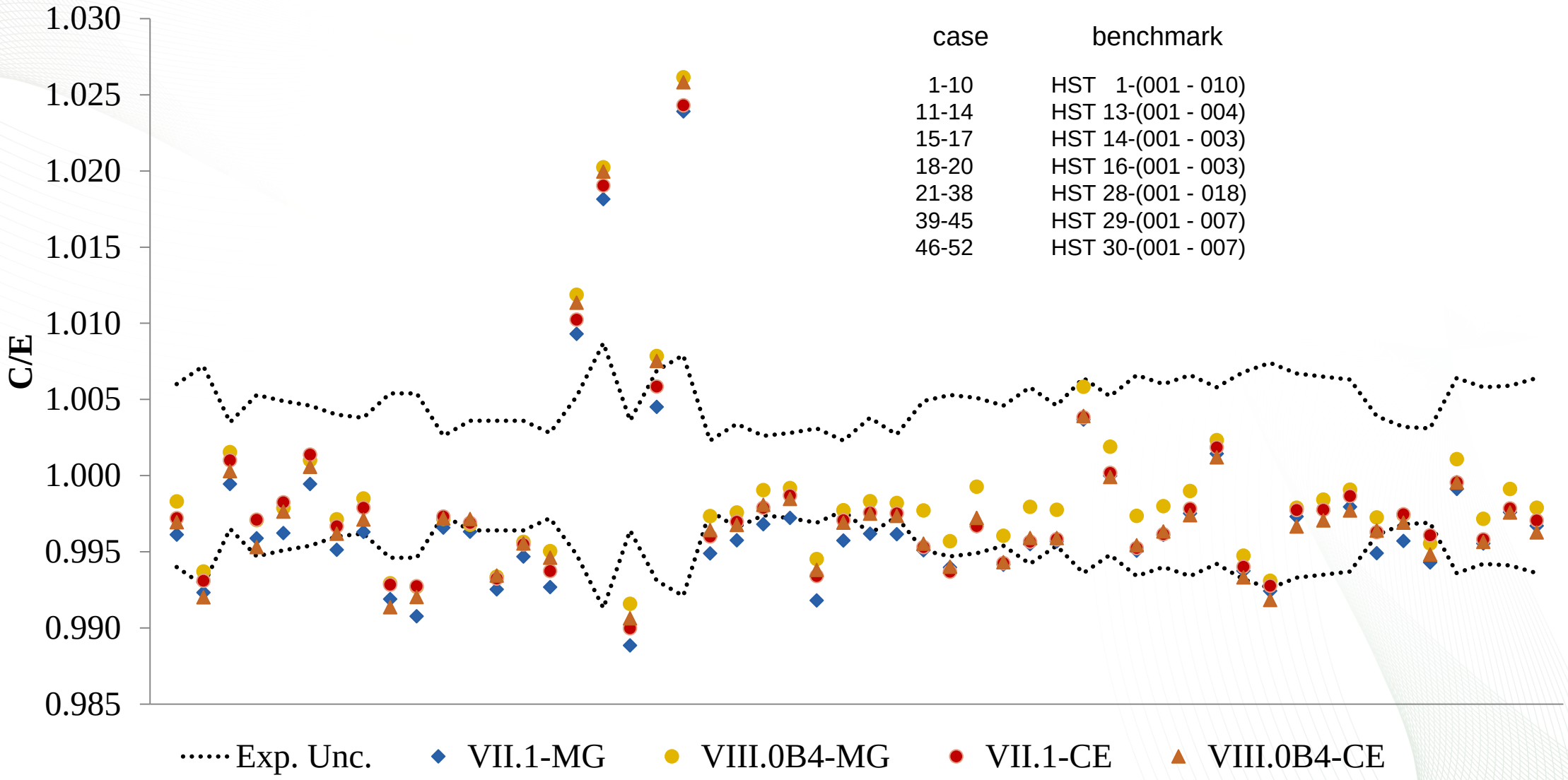
HST Results



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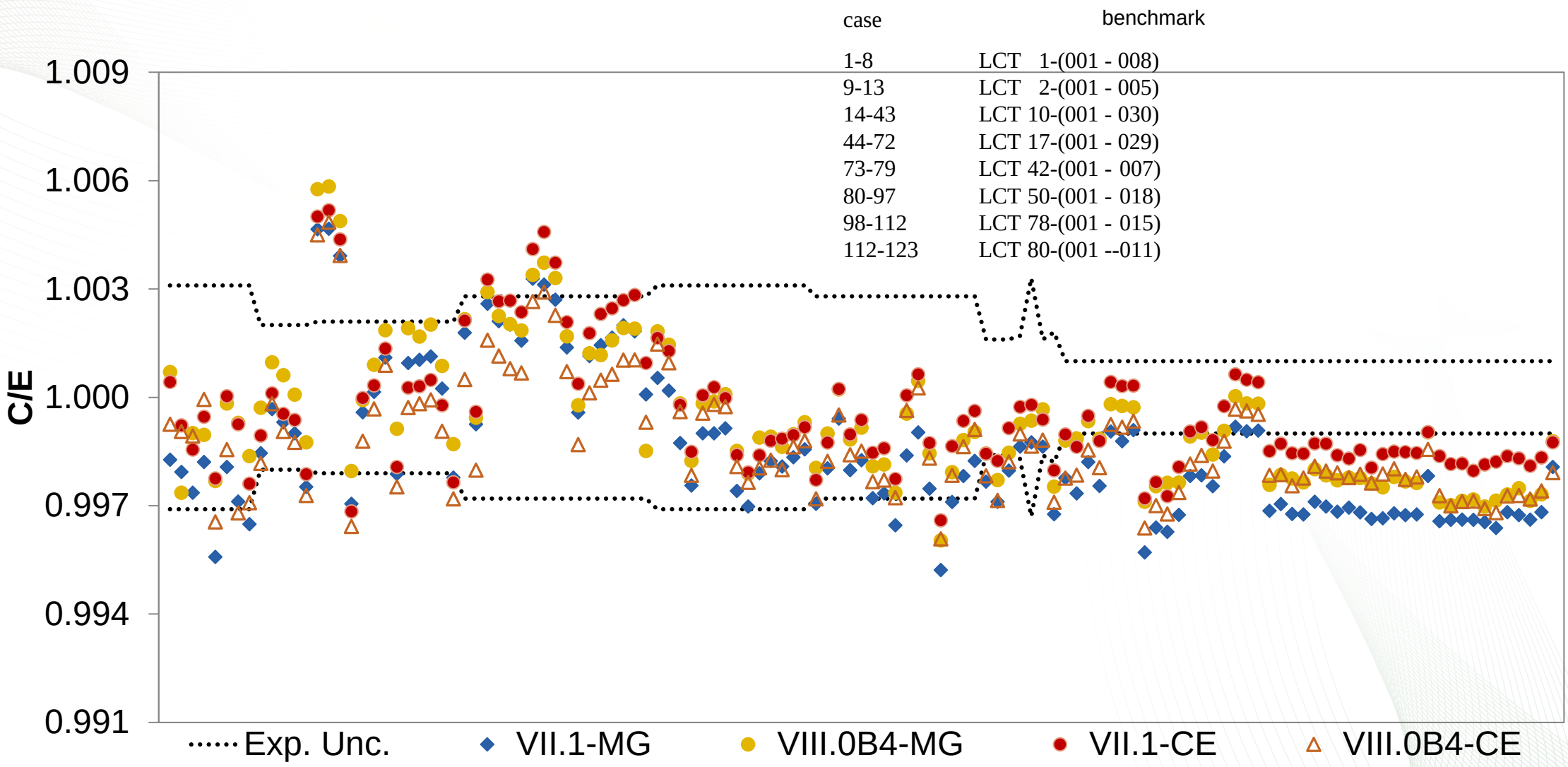
LCT Results



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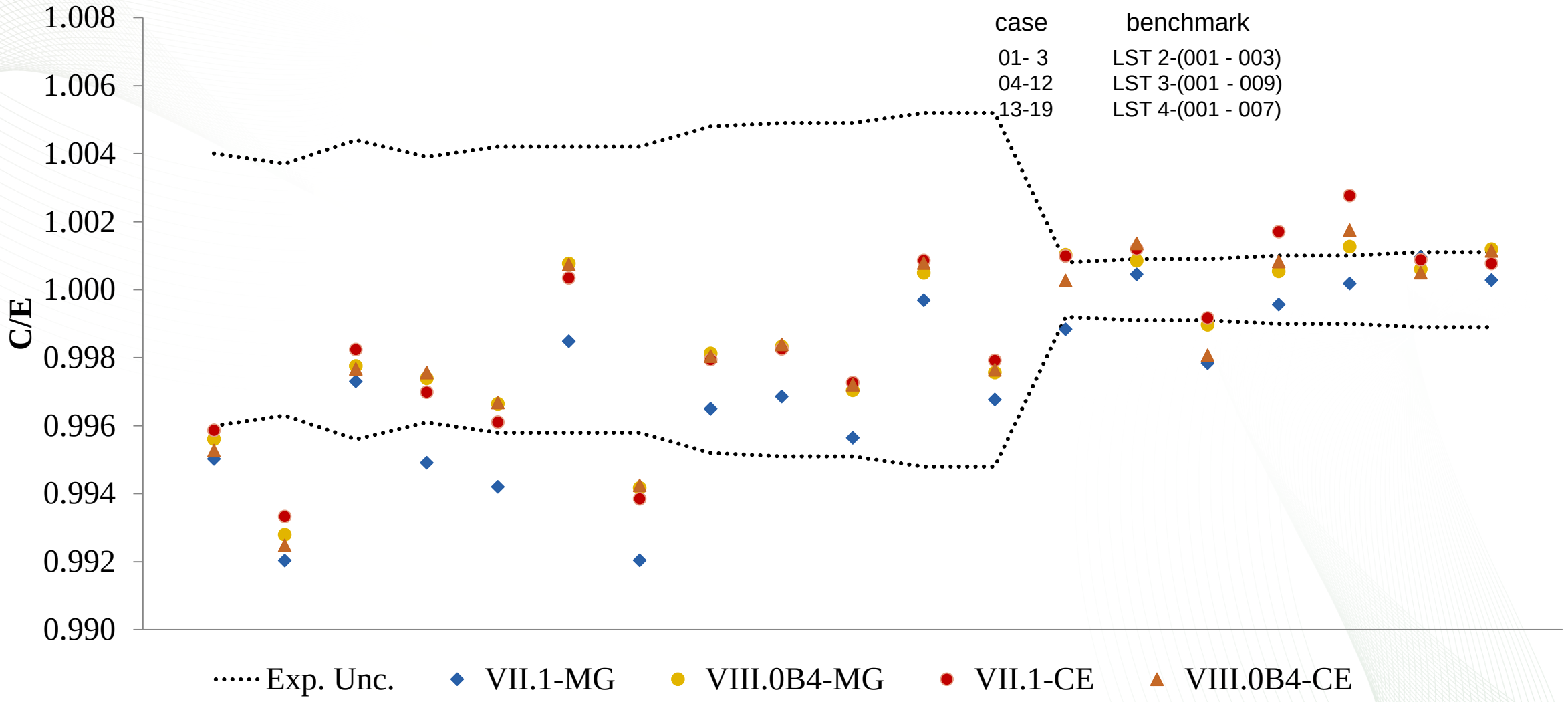
LST Results



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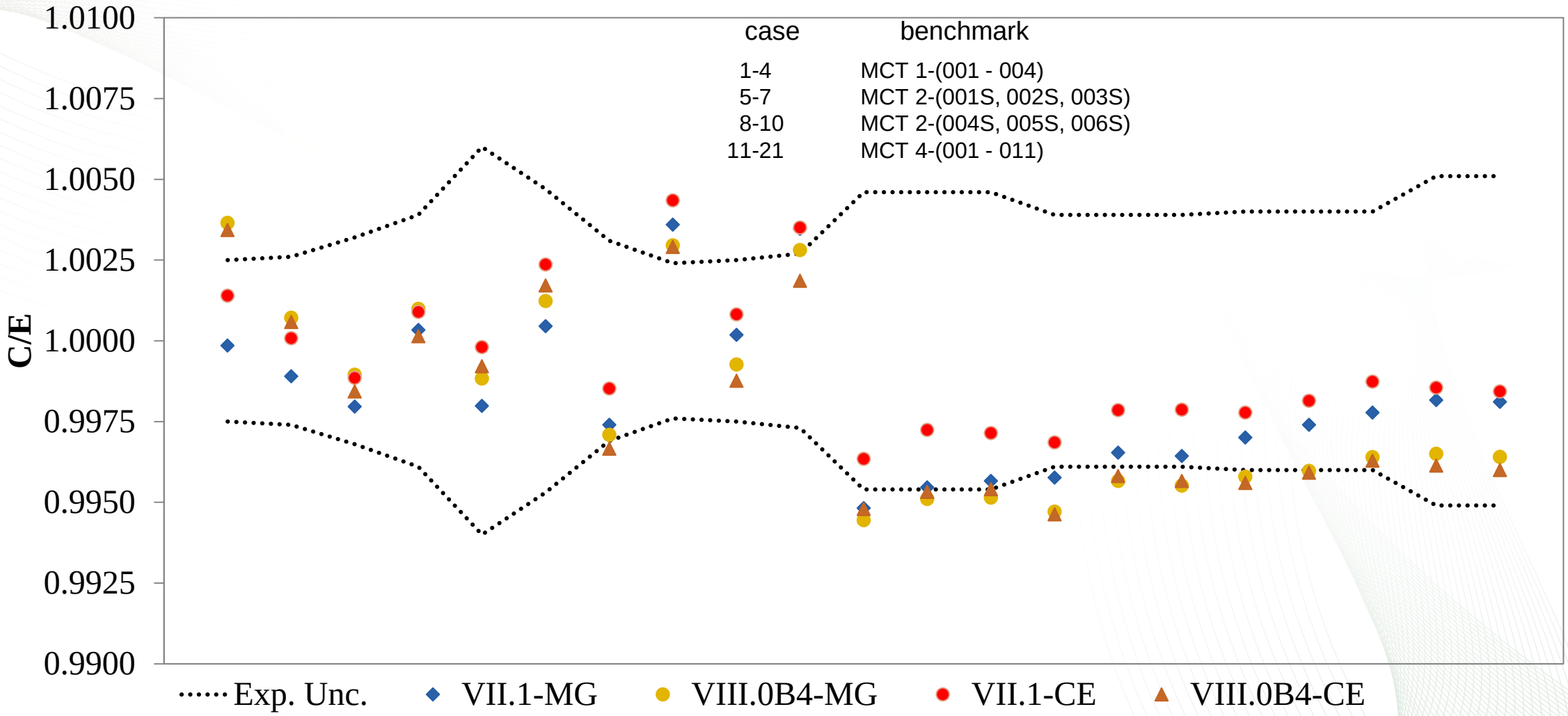
MCT Results



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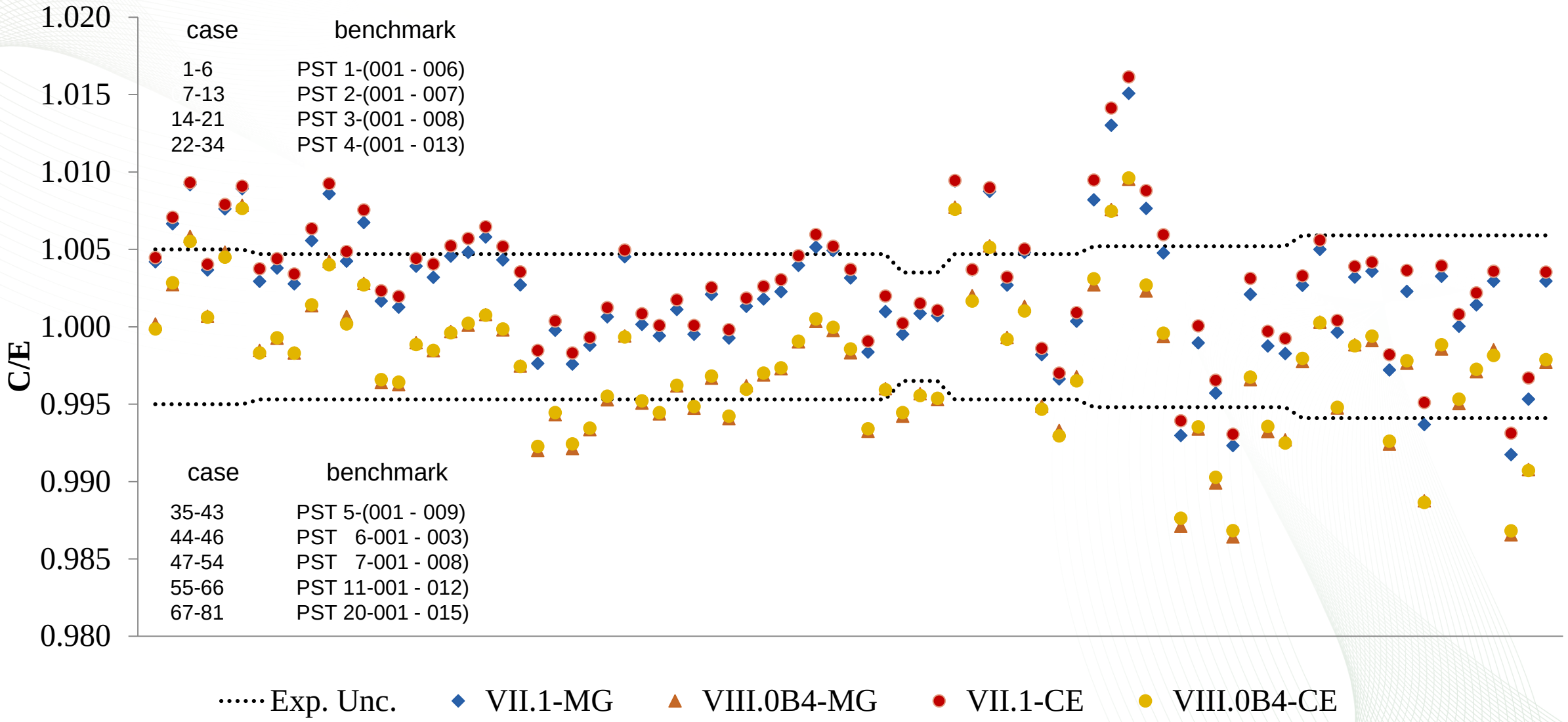
PST Results



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MST Results

Case	VII.1 MG	VIII.β4 MG	$\Delta(MG)$	VII.1 CE	VIII.0.β4 CE	$\Delta(CE)$
MST-002-001	1.00139	0.99601	-538	1.00116	0.99528	-589
MST-002-002	1.00154	0.99592	-561	1.00144	0.99545	-599
MST-002-003	1.00148	0.99601	-547	1.00113	0.99521	-592

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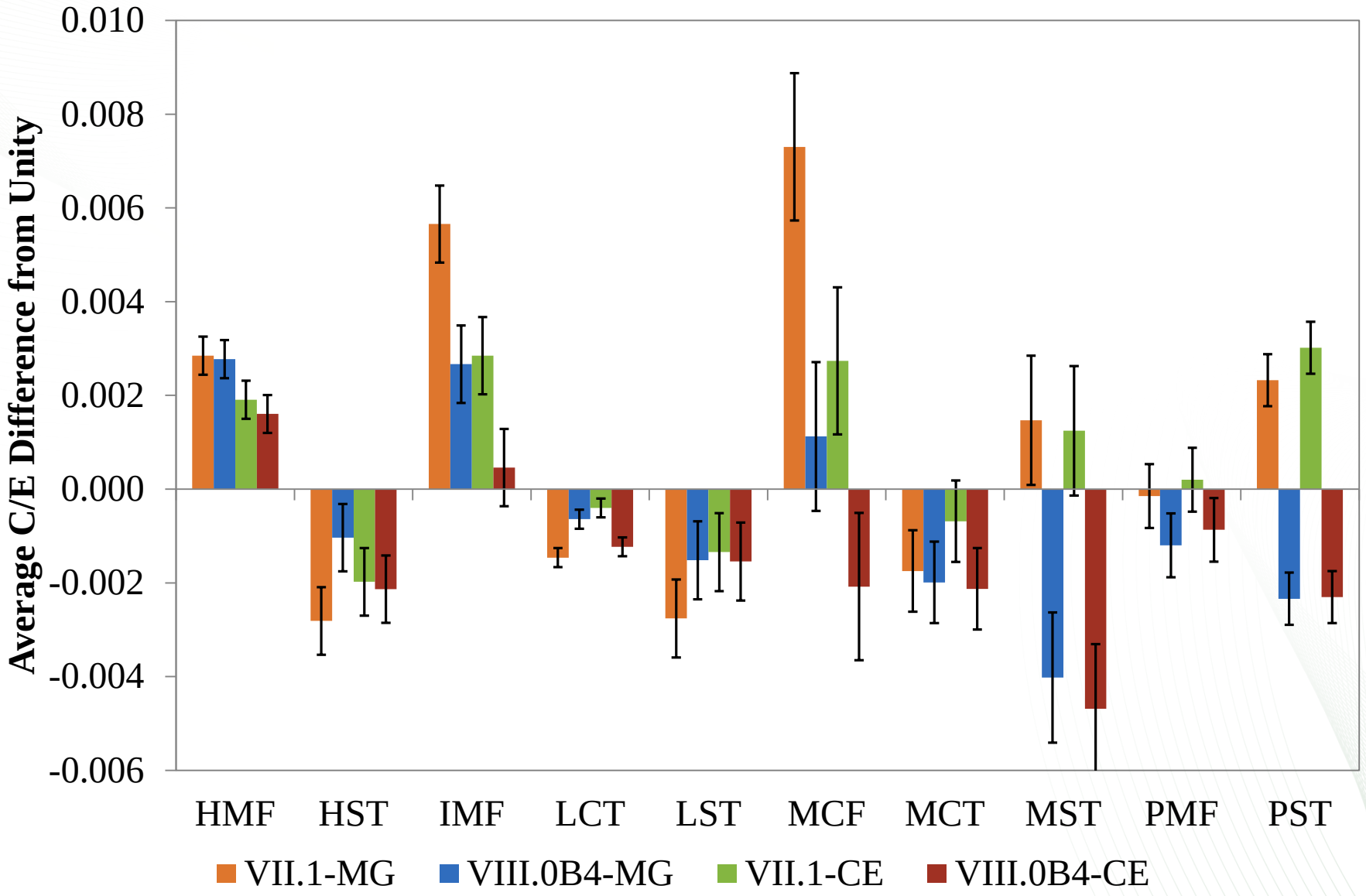
Group Averages



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Summary

- New data give new answers
  - No significant change in HMF, HST, IMF, or LST results
  - Marginal decrease in average k_{eff} prediction quality for LCT cases (CE)
  - Complete flip in computational bias for PST and MST systems

- Testing will continue with each new library release

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Questions?