Verification type	Sensitivity Studies (Grid and Parameter sensitivity)
Database reference	SEN-2
Topic / Application	H2-Air combustion
Physics	Length scales, premixed flames, detailed kinetics
Summary	Paper considers the grid resolution necessary to resolve combustion in a mixture of calorically imperfect ideal gases described by detailed kinetics and multicomponent transport
Description	The Paper considers the grid resolution necessary to resolve combustion in a mixture of calorically imperfect ideal gases described by detailed kinetics and multicomponent transport. Using the steady premixed laminar flame as a paradigm, the required spatial discretization to capture all detailed physics in the reaction zone is found via 1) determination of the finest grid used in a standard software tool which employs adaptive mesh refinement, 2) examination of peak values of intermediate species mass fractions in the flame zone as a function of grid size, 3) a formal grid resolution study, and 4) a robust new eigenvalue analysis developed to estimate the finest length scale. Application to laminar premixed flames in hydrogen-air flames reveals that the finest (extract from Abstract) The paper is useful in identifying that just because the flame speed is insensitive to further grid refinement, doe s not imply that the physics have been resolved appropriately. A more rigorous method is developed. The recognition of highly different length scales and the problems this poses to correct verification is useful for practitioners.
Case Title	On the Necessary Grid Resolution for Verified Calculation of Premixed Laminar Flames
Authors	Ashraf N. Al-Khateeb, Joseph M. Powers! and Samuel Paolucci
Year	2010
Online reference	Computational Physics Vol. **8**, No. 2, pp. 304-326 August 2010

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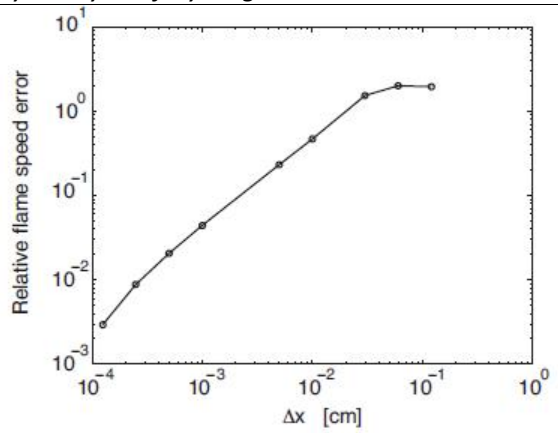
Case image	 Convergence of the relative error in laminar flame speed.
Governing equations	
Results	

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