

# Joint CQSE and CASTS Seminar

Weekly Seminar  
May 30, 2014 (Friday)

TIME May 30, 16:00 ~ 17:00  
TITLE Three Dimensional Reacting Gas Flow Simulation using  
Adaptive Grids and GPU Computing  
SPEAKER Prof. Matthew Smith  
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National Cheng-Kung University  
PLACE Rm716, CCMS & New Physics Building, NTU

## Abstract

In recent times, the rise in popularity of the GPU (Graphics Processing Unit) for parallel computation of CFD methods has led to the development of numerous solvers and parallel paradigms. However, the application of this technology to industrial design – as used by industrial engineers – is still lagging, with most companies still employing commercially available software to assist in design work. Presented here is the application of an inexact Riemann solver to an unstructured tetrahedral grid using Graphics Processing Units (GPU), design for use by several major industrial companies in Taiwan. The Riemann solver employed is Jacob's approximate solver which is suitable for situations where high temperature gradients are present in the absence of pressure gradients. The application employs an interface-based parallelization paradigm for surface flux computation and a cell based paradigm for state computations. The performance characteristics of the proposed implementation shall be presented, along with comparisons in performance across a various number of GPU devices and several industrial applications.

