8th. World Congress on Computational Mechanics (WCCM8)
5th. European Congress on Computational Methods in Applied Sciences and Engineering (ECCOMAS 2008)
June 30 – July 5, 2008
Venice, Italy

ADAPTIVE HIGHER ORDER VARIATIONAL METHODS FOR AEROSPACE APPLICATIONS

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Key words: Higher-Order Methods, Discontinuous Galerkin Methods, Adaptive Methods, Aerospace Applications

ABSTRACT

Computational Fluid Dynamics is a key enabler for meeting the strategic goals of future air transportation. However, the limitations of today's numerical tools reduce the scope of innovation in aircraft development, keeping aircraft design at a conservative level. Within the 3rd Call of the 6th European Research Framework Programme, the research project ADIGMA has been initiated at the end of 2006. The goal of ADIGMA is the development and utilization of innovative adaptive higher-order variational methods for the compressible flow equations enabling reliable, mesh independent numerical solutions for large-scale aerodynamic applications in aircraft design. The focus is put on further development and improvement of Discontinuous Galerkin and residual based methods. With the help of a highly skilled consortium well balanced between upstream research, applied research and aerospace industry, the ADIGMA project aims at overcoming the existing limitations and shortcomings of these methods for industrial applications. A critical assessment of the newly developed methods for large aerodynamic applications will allow the identification of the best numerical strategies for integration as major building blocks for the next generation of industrial flow solvers.

Topics to be addressed are higher-order Discontinuous Galerkin and residual based methods, efficient solution strategies for higher-order discretizations, innovative adaptation strategies (goal-oriented adaptation, *hp*-refinement, error estimation) as well as the assessment of advanced higher-order methods with respect to state-of-the-art CFD solvers in industry.