PARAMETRIC STUDIES OF SPACE-TIME STRUCTURES FOR CFD PROBLEMS

A.E. BONDAREV*

* Keldysh Institute of Applied Mathematics Russian Academy of Sciences
Moscow, 125047, Russia
e-mail: bond@keldysh.ru

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The paper presents a combined approach to finding conditions for space-time structures appearance in non-stationary flows for CFD (computational fluid dynamics) problems. We consider different types of space-time structures, for instance, such as boundary layer separation, vortex zone appearance, appearance of oscillating regimes, transfer from Mach reflection to regular one for shock waves, etc. The approach combines numerical solutions of inverse problems and parametric studies. Parallel numerical solutions are implemented. This approach is intended for fast approximate estimation for dependence of unsteady flow structures on characteristic parameters (or determining parameters) in a certain class of problems [1]. The numerical results are presented in a form of multidimensional data volumes. To find out hidden dependencies in the volumes some multidimensional data processing and visualizing methods should be applied. The approach is organized in a pipeline fashion. For certain classes of problems the approach allows obtaining the sought-for dependence in a quasi-analytical form. The proposed approach can be considered to provide some kind of generalized numerical experiment environment. Proposed scheme for such generalized experiment is presented in Figure 1. Examples of its application to a series of practical problems are given.

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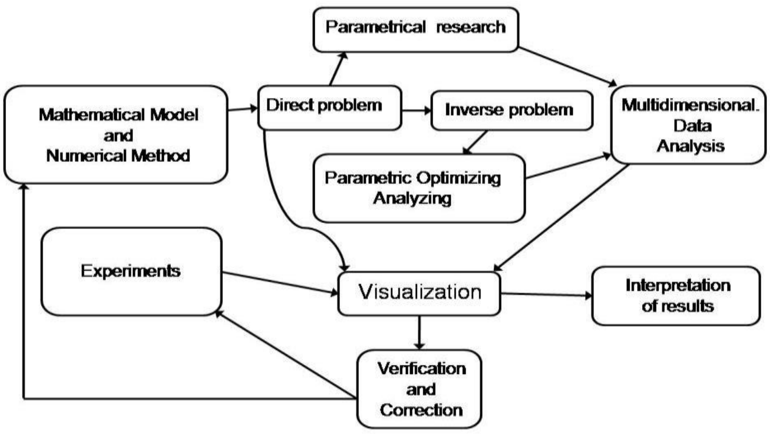

Figure 1: Scheme of generalized experiment

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