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В сборнике представлены доклады по вычислительной и прикладной математике. В них отражено современное состояние теории и приложений численных методов для решения уравнений математической физики, обсуждается проблематика теории разностных потенциалов и искусственных граничных условий, рассматриваются вопросы описания и расчетов турбулентных течений.

Proceedings of the International Conference «Difference schemes and applications» in Honor of the 90-th Birthday of Prof. V.S. Ryaben'kii Keldysh Institute of Applied Mathematics, May 27-31, 2013

The collection contains papers on computational and applied mathematics. They reflect the present state of the theory and application of numerical methods for solving the equations of mathematical physics, the problems of the theory of difference potentials and artificial boundary conditions are discussed, progress in calculation of turbulent flows are considered.

Программный комитет искренне благодарит за поддержку Российскую Академию Наук, Международную Ассоциацию по Математике и Компьютерам в Моделировании, Государственный Университет Штата Северная Каролина, США, Бюро Научных Исследований Армии США и Европейское Бюро Аэрокосмических Исследований и Разработок (EOARD), Лабораторию FlowModellium "Математическое моделирование нелинейных процессов в газовых средах" МФТИ.



Федеральное государственное бюджетное учреждение науки
Институт прикладной математики
имени М.В. Келдыша Российской академии наук

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# ОГЛАВЛЕНИЕ

The results were compared with all published experimental data and an instructive confirmation was found. An analogous investigation with the same conclusions was performed for boundary layer flows and wall-jets.

The authors came to the conclusion that the von Karman-Prandtl law is not correct. It should be excluded from the teaching process and replaced by proposed and experimentally approved power law.

## EFFICIENT TIME-STEPPING-FREE TIME INTEGRATION OF THE MAXWELL EQUATIONS

**M.A. Botchev**[1]

[1]*Department of Applied Mathematics, University of Twente, Enschede, the Netherlands, m.a.botchev@utwente.nl*

Solution of the time dependent Maxwell equations is an important problem arising in many applications ranging from nanophotonics to geoscience and astronomy. The problem is far from trivial, and solutions typically exhibit complicated wave properties as well as damping behavior. Usually, special staggered time stepping schemes are used [1]. Although their time step may be severely restricted by the CFL condition, performance of these schemes is hard to beat by modern implicit or exponential time integration schemes [2]. We show that in some cases so-called time-stepping-free schemes provide a very efficient alternative to the standard schemes. These schemes employ the matrix exponential function and can be implemented by special block Krylov subspace techniques [3,4].

Numerical examples demonstrating the efficiency of the proposed approach are presented, coming from the fields of nanophotonics and geoscience.

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