Joint Institute for Nuclear Research
Laboratory of Information Technologies

MATHEMATICAL MODELING AND COMPUTATIONAL PHYSICS

Book of Abstracts of the International Conference

Dubna, July 8–12, 2013

МАТЕМАТИЧЕСКОЕ МОДЕЛИРОВАНИЕ И ВЫЧИСЛИТЕЛЬНАЯ ФИЗИКА

Тезисы докладов международной конференции

Дубна, 8–12 июля 2013 г.

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В сборник включены аннотации докладов, представленных на международную конференцию «Математическое моделирование и вычислительная физика» (MMCP'2013). Полные тексты докладов, избранных программным комитетом конференции, будут опубликованы отдельно.

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The international conference "Mathematical Modeling and Computational Physics – 2013" (MMCP'2013) continues the rich traditions of previous conferences on mathematical simulations, numerical methods and computational physics which were repeatedly organized in Dubna: "Computational Modeling and Computing in Physics" in 1996, "Modern Trends in Computational Physics" in 1998, "The V International Congress on Mathematical Modeling" in 2002, "Mathematical Modeling and Computational Physics" in 2006 (Slovakia), 2009 (Dubna), and 2011 (Slovakia).

The work of the Conference is organized on the following topics:

- distributed and parallel computing in science and technology;
- mathematical methods and tools for modeling complex systems;
- computational biophysics and chemistry, bioinformatics;
- mathematical methods and software for experimental data processing;
- computer algebra and quantum computing with applications.

The expected total number of the conference attendees will exceed 200 scientists from JINR, Russia, Armenia, Belarus, Bulgaria, Germany, Mongolia, Romania, Slovakia, Ukraine, Vietnam, etc.

The Conference information site http://mmcp2013.jinr.ru

THE METHOD OF STOCHASTIZATION OF ONE-STEP PROCESSES

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Usually at stochastization of mathematical models stochastic term is introduced as the external noise. This action can only characterize the environment, but not itself system under study. There is a need introduce the stochastic term in concert with deterministic, that is, to receive both parts of one and the same first principles. A method is presented stochastization of models describing the single-step processes (birth-death processes) [1, 2]. The method allows to obtain deterministic and stochastic components from first principles that allows us to consider these pieces matched with each other. For equations used notation of chemical kinetics. In addition to simple the law of mass action can be used trophic functions. Application of the method demonstrated by the environmental [3] and telecommunication models.

References

[1] C. Gardiner *Stochastic Methods: A Handbook for the Natural and Social Sciences.* — Springer; 4th ed. 2009.

[2] N. G. Van Kampen *Stochastic Processes in Physics and Chemistry.* — North Holland; 3 edition 2007.

[3] A. J. Lotka *Elements of physical biology.* — Baltimore: Williams and Wilkins, 1925.