

# Using of Gröbner bases for the construction of the FDA

Vladimir P. Gerdt and Yury A. Blinkov

**Abstract.** In the 60s of the last century, academician N. N. Yanenko formulated the method of differential approximation of the difference scheme. The main idea of this method is to replace the investigation of the properties of the difference scheme by the investigation of a problem with differential equations. Thus this new system of differential equations occupies an intermediate position between the original differential problem and the difference scheme approximating it.

Using the technique of Gröbner bases, we want to propose more general and pure algebraic definition for the notion of the first approximation, including the definitions of N. N. Yanenko as a special case.

Vladimir P. Gerdt

Laboratory of Information Technologies  
Joint Institute for Nuclear Research  
Dubna, Russia  
e-mail: [gerdt@jinr.ru](mailto:gerdt@jinr.ru)

Yury A. Blinkov  
Mechanics and Mathematics Department  
Saratov State University, Saratov, Russia  
Department of Applied Probability and Informatics,  
Peoples' Friendship University of Russia, Moscow, Russia  
e-mail: [blinkovua@gmail.com](mailto:blinkovua@gmail.com), [blinkov\\_yua@pfur.ru](mailto:blinkov_yua@pfur.ru)

---

The work was supported by the Russian Science Foundation (grant no. 20-11-20257).