

## DIPLOMA THESIS EVALUATION

### OPPONENT EVALUATION

**Authorname:** Aleksandr Fedorov  
**Opponent:** Vladimir Lobanov, Ph.D.  
**Thesis title:** Robot dynamics and control based on exponential matrices

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|---|----------------------|
| A. Abstract quality, keywords matching . . . . .  | Excellent (1)        |
| B. Research scope and processing . . . . .  | Excellent minus (1-) |
| C. Level of theoretical part . . . . .  | Excellent (1)        |
| D. Appropriateness of the methods . . . . .   | Very good (2)        |
| E. Results elaboration and discussion . . . . .   | Excellent minus (1-) |
| F. Students own contribution . . . . .  | Excellent (1)        |
| G. The conclusion statement . . . . .   | Excellent (1)        |
| H. Fulfillment of Thesis tasks (goals) . . . . .  | Fulfilled            |
| I. Structure, correctness and fulness of references . . . . .                             | Excellent (1)        |
| J. Typographical and language level . . . . .   | Excellent minus (1-) |
| K. Formal quality . . . . .<br>(text structure, chapters order, clarity of illustrations) | Excellent (1)        |

#### Comments, remarks

Master's thesis by Aleksandr Fedorov is devoted to research of possibility describing dynamics of multilink manipulator with the help of exponential matrices. The relevance of this topic don't beyond question because in present time a vast number of plant facilities are using in their production process a robotic systems for realization chores or work representing threat for life and health of human. Researching the possibility of applying a new mathematical tool for describing robot dynamics is science intensive task and will allow specify the ways of future progress of this scientific direction. The author was analysing the existing describing methods as kinematic and dynamics of multilink manipulators. Because of its features method based on exponential matrices undoubtedly deserve special attantion.

At performance of work the Aleksandr Fedorov used knowledges and skills obtained by studying special disciplines. Carry out deep analysis the well known methods for solving task in view, reserching of methods kinemtics and dynamics of robots was carry out on the high theoretical and practical level. The dynamic model was realising in view of algorithym based on exponential matrices. Carry out the simulation and comparison of the obtained results with the well known methods.

When implementation of master thesis Aleksandr Fedorov was show ability work with the experts, with complicated special litreture, ability solve difficult scince task without assistance and deep understanding subject of researching.

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**Overall assessment:**

The material of master thesis is a logically structured and presented in scientific style.  
The volume of work consists of 127 pages, among of them the main part presented on 90 pages.  
Significant shortcomings in the work not found.

**Questions for the defense:**

1. Why you decided chose the newton-euler method for comparison with method based on exponential matrices?
2. Which type of coordinates are using in method based on exponential matrices?

**Overall classification:**

Work meets the Master degree requirements and therefore I recommend it for defense  
I suggest to classify this work by grade Excellent (1)

In Russia Federation, Saratov

date 20.03.2015

By signing I certify that I am not in any personal relationship with the author of the thesis

...  ...

Opponent signature