

Review of Ph.D. Thesis

Ph.D. candidate: Ing. Filip Kocina
Title: Advanced Electronic Circuits Simulation Methods

Reviewer: doc. Dr. Ing. Jan Kyncl
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Summary

The submitted Ph.D. thesis "Advanced Electronic Circuits Simulation Methods" investigates selected topics in the circuit simulation. The research questions addressed in the Ph.D. thesis are a state of the art problem in the simulation of large systems and provide research challenges required for Ph.D. level work.

The presented work has several original contributions. The author introduces a series of mathematical procedures that allow very rapid solution of systems of ordinary differential equations. A number of transformations that allow this acceleration can be individually found, but the author systematically lists their entire set including derivations. The author intelligently combines the use of mathematical analysis and numerical methods.

The class of problems for which the author's approach provides substantial acceleration is relatively narrow, however, for the simulation of electronic circuits (VLSI etc.) is a corrective benefit.

The thesis is reasonable organized and written.

The results of Ph.D. thesis were published on several conferences and in some journals. Ph.D. candidate significantly contributed to the papers.

Is the topic appropriate to the particular area of dissertation and is it up-to-date from the viewpoint of the present level of knowledge?

The topic is appropriate and the document is to the best of my knowledge up-to-date with respect to the state of the art.

Is the work original and does it mean a contribution to the area - specify where the original contribution lies?

The originality of this work lies in my view in the optimal combination of ODE transformations and the use of MTSM.

Has the core of the doctoral thesis been published at an appropriate level?

I believe the core technical content has been sufficiently disseminated in Journals, Conferences, Workshops and Technical Reports.

Does the list of the candidate's publications imply that he is a person with an outstanding research erudition?

The publications show that author possess sufficient knowledge in his field of expertise and ability for research.

I have following defense questions:

- Algebraic equations can be excluded both by adding parasitic capacities and by using their derivatives with respect time (and solving algebraic equations only for initial conditions). What are the advantages and disadvantages of both approaches?
- The method used by the author is suitable for cases where functional dependencies of circuit elements can be described by combinations of elementary functions. What if we wanted to use the interpolation functions specified by the interpolation order and value table?

Conclusion

I have an overall positive view on presented work and the Ph.D. candidate. I am able to state that Ph.D. candidate was able to work independently and creatively in the field of simulation of electronic circuits. The Ph.D. thesis meets the standard requirements for the Ph.D. degree and I would like to recommend it for acceptance. I support the award of Ph.D. degree to Filip Kocina.

Prague, 18. 10. 2017

doc. Dr. Ing. Jan Kyncl