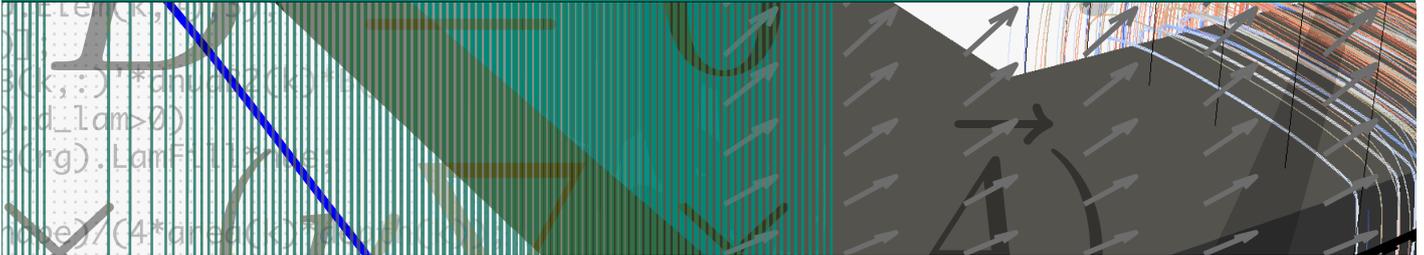


# Implementing TRBDF2 for a Python-based circuit simulator



TECHNISCHE  
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Proposal for a Bachelor's thesis | Master's thesis | Seminar topic  
Study field: Computational Engineering | Electrical Engineering | Mathematics  
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## Description

TRBDF2 is one of the standard time integration schemes for circuit simulation. The goal of the thesis is to implement the method as described in [2], while conforming to the interface specified by the `scipy.integrate` package [3].

Depending on progress, more recent extensions regarding adaptive time stepping from [1] or [4] may also be investigated and implemented.

## Prerequisites

Good programming skills in Python.

## References

- [1] G. P. Fang, "A new time-stepping method for circuit simulation," in 2013. doi: 10.1145/2463209.2488904
- [2] M. E. Hosea and L. F. Shampine, "Analysis and implementation of TR-BDF2," *Applied Numerical Mathematics*, 1996. doi: 10.1016/0168-9274(95)00115-8
- [3] P. Virtanen et al., "SciPy 1.0: Fundamental algorithms for scientific computing in python," *Nature Methods*, 2020. doi: 10.1038/s41592-019-0686-2
- [4] J. Yao, T. Wang, and J. Roychowdhury, "An efficient time step control method in transient simulation for dae system," in 2014. doi: 10.1109/ICECS.2014.7049917

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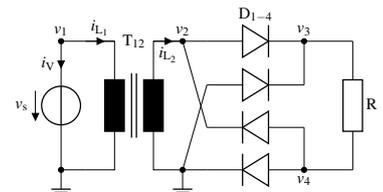


Figure 1: Full wave rectifier.

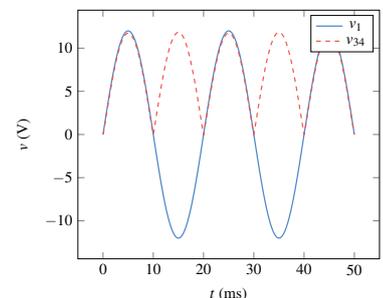


Figure 2: Solution corresponding to Figure 1.