

Bachelor Thesis (Bakkalaureatsarbeit)

on the topic

“Piezoelectric Equations”

- **Title:** Piezoelectric Equations
- **Supervisor:** o.Univ.-Prof. Dr. Ulrich Langer
- **StudentIn:** Johannes Renner
- **Abstract:** The thesis should give the derivation of the linear elasticity equations and the electrostatic equations from the Maxwell equations. Furthermore, the author should describe the background of the piezoelectric effects and derive the piezoelectric system of partial differential equations that is nothing but the piezoelectric coupling of the linear elasticity equations with the potential equations in electrostatics. Finally, the author should discuss some benchmark problems. There are benchmark problems where the analytical solution can be defined ?
- **Road Map for the Bachelor Thesis:**
 1. Introduction
 2. Linear elasticity equations
 3. Maxwell’s equations and electrostatics
 4. Piezoelectric coupling
 5. Piezoelectric benchmark example
 6. Conclusions
 7. References
- **Literature:** Lectures and Seminars (Proseminar) on Mathematical Models in Engineering
- **Additional Literature:** [1] can be downloaded from [www.qucosa.de/recherche/frontdoor/?tx_slubopus4frontend\[id\]=5836](http://www.qucosa.de/recherche/frontdoor/?tx_slubopus4frontend[id]=5836)

References

- [1] Peter Steinhorst. *Anwendung adaptiver FEM für piezoelektrische und spezielle mechanische Probleme*. PhD thesis, Technische Universität Chemnitz Fakultät für Mathematik, 2009. [http://www.qucosa.de/recherche/frontdoor/?tx_slubopus4frontend\[id\]=5836](http://www.qucosa.de/recherche/frontdoor/?tx_slubopus4frontend[id]=5836).