

**Report on the doctoral thesis “Variational strategies in material sciences:  
Analysis & Numerics”**

by Antonin Cesik

for the study program mathematics at the Department of Analysis, Charles University

The thesis contains four works of which one is published very well, one is accepted by JDE one sent back to the journal and one will become a preprint soon. All works are about variational schemes for hyperbolic problems. The thesis contains these works after an informative and well written introductions.

1. Papers I and II are about collisions of elastic solids are considered. These are works independent of me that have been achieved with G. Gravina and M. Kampschulte. To my understanding his impact on the work has gradually grown, as is expected of a PhD student.
2. Paper III is a work in collaboration with me his supervisor. In this work stability and convergence results for in time approximations for hyperbolic solid dynamics are analyzed. As a byproduct also regularity for such solutions is shown. This paper contains a lot of technical highlights and novelties including discrete Gronwall type estimates involving two time scales. Antonin worked out the paper with very mild supervision. Many issues where solved by him alone with great originality and skill.
3. Paper IV (a collaboration with Malte Kampschulte and me) has only been written very recently by Antonin. Here he worked already like a strong postdoc: He picked up the ideas from Malte or me and incorporated them in the highly complex body of methodology of *the variational approach for fluid-structure interactions*. This was achieved with great accuracy and quality.

I consider these results to be of high significance and importance. Moreover, I believe that Antonin became a true expert in the existence analysis for largely deforming solids, contact questions and fluid-structure interactions. His excellent performance allowed him to choose (out of several good options) a postdoc position at Warwick University to work in the ERC Consolidator Grant lead by Filip Rindler.

Conclusively I consider it an honor to be the supervisor of Antonin and I support his application for a PhD without the slightest hesitation.

Dr. Sebastian Schwarzacher

17.09.2026