

Review of the doctoral thesis of Mgr. Jakub Tichý
Qualitative properties of solutions to equations of fluid mechanics

The thesis consists of two published results

- Tichý, Jakub. *Regularity of planar flows for shear-thickening fluids under perfect slip boundary conditions*. Electron. J. Differential Equations 2014, No. 70, 20 pp
- Kaplický, Petr; Tichý, Jakub. *Boundary regularity of flows under perfect slip boundary conditions*. Cent. Eur. J. Math. **11** (2013), no. 7, 1243–1263

and an article accepted for publication

- Mácha, Václav; Tichý, Jakub. *Higher integrability of generalized Stokes system under perfect slip boundary conditions*. J. Math. Fluid Mech.

All results deal with regularity of weak solutions to a generalized (Navier) Stokes system equipped with the perfect slip boundary condition. Main focus is put to regularity results up to the boundary.

I think that the results in the thesis are interesting, important, and develop the understanding of regularity of flows of non-Newtonian fluids up to the boundary. Even though the techniques used in proofs are rather technical, Jakub Tichý presents them with understanding and clearly so that the text is well readable. The formal layout of the thesis is good, it is typeset in \LaTeX .

The collaboration with Jakub Tichý was excellent. If I still should find a moment where I was not completely satisfied with his work, it was when Jakub tempted to claim that some statements were obvious just because they were similar to some other known results. However, we cleared this point as it can be seen in the thesis.

It was very nice to see how the attitude and mathematical culture of Jakub Tichý evolves in time. In the beginning of his studies it was necessary to collaborate very closely to finish given goals while at the end Jakub worked almost completely independently.

I am sure that Jakub Tichý is a mathematician and he could start a successful scientific career. This is reflected in his thesis. I strongly recommend to accept it for the doctoral degree.

In Choceň, August 24, 2014

doc. Mgr. Petr Kaplický, Ph.D.
supervisor of the thesis