# USCDornsife

Dana and David Dornsife
College of Letters, Arts and Sciences

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To the Habilitation Committee:

It is a great pleasure to write the habilitation letter for Dr. Schwarzacher. I support his promotion in the strongest possible terms!

I have previously not met Dr. Schwarzacher, but I have been following (and admiring) his research closely since I work in the area of fluid-structure interaction.

Dr. Schwarzacher work is very influential in the area of fluid-structure interaction and is also the main subject of his habilitation thesis. The habilitation thesis contains many excellent results, which are important building blocks for the theory. Note that the weak solutions of fluid-structure interaction systems are notoriously hard to analyze due to the evolution of the free boundary and due to various mismatches of the types of equations (parabolic/hyperbolic), lack of scaling, and the difficulties related to the boundary conditions.

The first chapter is introductory and nicely summarizes the results of the thesis. The second chapter contains the proof of the existence of a weak solution for the non-linear Koiter shell coupled with an incompressible fluid (Theorem 1.1.1), while the second main theorem (Theorem 1.1.2) addresses the additional regularity of the elastic displacement. Both results are the first rate and could be considered the main mathematical works on the fluid-Koiter shell model. It is important that the method is applicable to more general situations. The third chapter is on the existence of solutions for the Navier-Stokes-Fourier fluids. The existence has to be treated very differently due to the different nature of the equation. The rest of the thesis contains many important and interesting results, including the weak-strong uniqueness, variational approach, and numerical analysis of the famous contact-less bounce problem.

I was asked to comment on some colored passages concerning some overlaps with existing mathematics. I do not see the slightest problem since the overlap is with his own published papers.
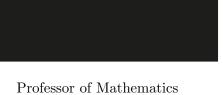
In conclusion, Dr. Schwarzacher is an outstanding researcher, and his thesis is of exceptional quality. I recommend his habilitation in the strongest possible terms!

Sincerely yours,

Professor of Mathematics
University of Southern California
Los Angeles, CA 90089-2532
e-mail: kukavica@usc.edu
telephone: (213) 740-3781