Evaluation of the PhD candidate

name:	Ing. Pavel Exner
Datum narození:	14. 6. 1989
address:	Ježkova 911, Liberec 6, 460 06
institute:	NTI
supervisor:	Mgr. Jan Březina, Ph.D.
form of study:	prezenční
study program:	P 3901 Aplikované vědy v inženýrství
field:	3901V055 Aplikované vědy v inženýrství

Pavel Exner started his doctoral studies in 2013 focusing on the application of suitable enrichment methods to the groundwater flow problems with singular solutions. The main result of his work is the implementation of the framework for the enrichment methods within the software Flow123d for simulation of transport processes in fractured porous media. He started with a comparison of several methods on the aquifer-well communication problem. Later he has implemented necessary
technical prerequisites: the adaptive quadrature, the intersection algorithms, identification of enriched elements, evaluation of enrichment and solution output on refined meshes.
He has tried several approaches to the enrichment of the velocity space in the mixed formulation of the Darcy flow problem. Finally, the improved approximation of the solution around 1d wells in the 3d domain has been demonstrated. The candidate also derived a weak formulation of the test problems and proved basic existence results. Part of the results has already been published in high-quality journals and presented at international conferences.

Pavel Exner contributed in a substantial way to the recent development of the Flow123d simulator
far beyond the subject of his thesis. He also participated in several research projects.

During his studies, he has completed six-month internship at the Technical University of Munich supervised by Barbara Wohlmuth. He has passed the exams: 'Modelling of nonlinear and coupled processes in underground environment', 'Mixed and hybrid methods', 'Finite element method 2' and English.
The doctoral exam has been passed on 23. 5. 2016. Pavel Exner is employed at TUL and he participates in the teaching of the subjects: 'Aplikovaná matematika', 'Metoda konečných prvků', 'Seminář z matematiky' a 'Matematika 4'.

The thesis ``Extended finite element methods for approximation of singularities'' have substantial scientific contribution and I recommend it for defense.

In Liberec 20. 5. 2019, doc. Mgr. Jan Březina, Ph.D.