

**Advisor report on the thesis**  
Operators related to Fourier Transform  
*by Eva Buriánková*

The goal of the thesis was to extend some recent results of the advisor and his coauthors on bilinear singular integrals and bilinear Fourier multipliers. While the boundedness of smooth bilinear singular integrals was known for some time, corresponding result for bilinear singular integrals with rough kernel was obtained only recently. As a related result, some novel results on boundedness of bilinear Fourier multipliers were obtained as well. There were two main directions in which continue this research, to expand the bilinear results or to generalize them to the multilinear setting. Eva succeeded in both.

The first part of the thesis is an article which builds on the boundedness of the bilinear singular integrals with rough kernel and proves similar result for its maximal version. In order to do so, we had to clear several roadblocks. First was to prove the boundedness of several auxiliary bilinear maximal operators. This technical part of the article was handled by Eva with minimal guidance on my part. The main proof then consists of two parts, one handles the diagonal part of the operator and did not need much modification, while second was concerned with the off-diagonal part and here we needed a few new ideas. Eva contributed very significantly to this part of the article and solved several problems independently.

The second article included in the thesis studies the bilinear bump multiplier. The study of the bilinear singular integrals with rough kernel revealed new results concerning bilinear Fourier multipliers. The key part of this theory is a question what are the properties of a bilinear singular multiplier with a symbol formed from equally spaced smooth bumps. In this article, we give an optimal answer to this question for many combinations of  $L^p$  spaces. This was a joint effort with other authors. Eva contributed significantly to several parts of the article, moreover she did some work which is not included in the final version, but helped to clarify the problem.

Third part of the thesis is a work in progress. This is a part of an effort of several authors to generalize the previously mentioned bilinear results to the multilinear setting. While the article is not ready for publication yet, the thesis includes very significant result, which will make it possible to obtain the optimal results for certain combinations of Lebesgue spaces. This part was done mostly independently by Eva.

In addition to this, the thesis contains a very thorough and well written introduction, which puts all the results in context of the known

theory. This part was created completely by Eva. Overall major part of the thesis was written directly by Eva, and in the remaining parts, such as the second article, she was a very active collaborator.

Besides working on her thesis, Eva very actively participated in other aspects of scientific life. In her second year, she successfully applied for a student grant, she actively presented her results in numerous conferences and she formed relationships with her international colleagues.

To conclude I believe that the presented thesis easily exceeds the standards for Ph.D. thesis at our school and I recommend it.

Petr Honzík