

# Integrally invertible graphs and their spectra

SOŇA PAVLÍKOVÁ

(in collaboration with Daniel Ševčovič)

*Institute of Information Engineering, Automation, and Mathematics, FChPT,  
Slovak Technical University, Bratislava, Slovakia*

In this talk we are concerned with integrally invertible graphs. We investigate a class of the so-called positively and negatively invertible graphs. The positively invertible graphs are invertible graphs in the usual Godsil's sense [1]. A graph is positively (resp. negatively) integrally invertible if its adjacency matrix has an integral inverse matrix which is signable to a nonnegative (resp. positive) matrix. In contrast to positive invertibility, the negatively invertible graphs have not been studied before, despite the fact that this class includes important molecule models and have thus applications in chemistry.

We construct new families of integrally invertible graphs based on bridging of two such graphs over the subset of their vertices. We derive sufficient conditions for integral invertibility of bridged graphs and analyze their spectral properties. We also obtain lower bounds for their least positive eigenvalue. The presentation is based on papers [2, 3]

## References

- [1] Godsil C. D. Inverses of Trees *Combinatorica* **5**, 33–39, 1985.
- [2] Pavlíková S. A note on inverses of labeled graphs *Australasian Journal on Combinatorics*, to appear, 2016.
- [3] Pavlíková S., Ševčovič D. On a Construction of Integrally Invertible Graphs and their Spectral Properties submitted, 2016.