An Overview of Symbolic Computation on Operator Theory

Ana C. Conceição

CEAF, Universidade do Algarve

The main goal of this paper is to show how the computer algebra system Mathematica allows us to study and to develop some topics on Operator Theory. In particular, some calculation techniques are presented for computing singular integrals ([5]), algorithms for solving integral equations ([1,2,4]), algorithms to factorize matrix functions ([1,2,3,4,6]) and algorithms to study the spectra of singular integral operators ([7,8]). The design of our algorithms was focused on the possibility of implementing on a computer all, or a significant part, of the extensive symbolic and numeric calculations present in the analytical algorithms. The methods developed rely on innovative techniques of Operator Theory and have a great potential of extension to ever more complex and general problems. Also, by implementing these methods on a computer, new and powerful tools are created for exploring that same potential, making the results of lengthy and complex calculations available in a simple way to researchers of different areas. We hope that our work within the Operator Theory, and with Mathematica, points the path to the future design and implementation of several other analytical algorithms, with numerous applications in many areas of research and technology.


