Applications of SAGBI-bases to equivariant dynamics

Karin Gatermann
ZIB Berlin, Germany.
E-mail: gaterman@math.berkeley.edu

SAGBI bases are a tool for computing efficiently with subalgebras such as invariant rings of group actions. We generalize this concept for modules over subalgebras such as the module of equivariants. Our motivation is the usage of SAGBI bases for the organisation of algorithms in equivariant dynamics such as numerical Liapunov-Schmidt reduction and reduction onto center manifold which exploit symmetry. In both algorithms some coefficients of the equivariant polynomial vector field are computed while others are given linear equations due to symmetry. A good choice for the first set of coefficients are the coefficients of the leading monomial algebra or module, respectively. The leading monomials are given by the SAGBI basis and the linear equation are easily determined from the SAGBI basis, too.