HRISTO SENDOV, The University of Western Ontario
A unified approach to spectral and isotropic functions

We propose and investigate a family of maps from the space of $n \times n$ symmetric matrices, S^n, into the space $S^{\binom{n}{k}}$ for any $k = 1, \ldots, n$ which are invariant under the conjugate action of the orthogonal group O^n. This family, called k-isotropic functions, not only generalizes all known types of maps with similar invariance property, such as the spectral, isotropic, primary matrix functions, multiplicative compound, and additive compound matrices on S^n, but also contains many previously unknown and potentially interesting subclasses of functions.

We give necessary and sufficient conditions for these maps to be r-times differentiable and exhibit a recursive formula for the r-th derivative. Moreover, we provide a full description of the linear k-isotropic functions which provides a generalization to Hooke law in classical linear elasticity. Finally, we exhibit a duality motivated by the Hodge star operator between different classes of k-isotropic functions.

This is a joint work with Mehdi S. Mousavi.