Eigenvalue crossings and symmetries in a linear family of 3x3 symmetric matrices

Daniel Dix[1]

The Watson-Domokos Theorem allows the discriminant of the characteristic polynomial of a 3x3 real symmetric matrix to be written as the sum of squares of five polynomials in the entries of the matrix. We use this theorem to completely characterize the eigenvalue crossings in a certain family of such matrices, depending linearly on 3 real variables so that permutations of these variables fix the eigenvalues, and investigate the degree to which eigenvalue crossings must occur at places, or in cases, which possess higher than normal symmetry.

[1]) University of South Carolina
      dix@math.sc.edu