The 19th Seminar on
Commutative Algebra and Related Topics,
January 31-February 01, 2024, School of Mathematics, IPM, Tehran

On the Reduction of Hankel Determinantal Ideals

Maral Mostafazadehfard
Federal University of Rio de Janeiro, Brazil

The generic Hankel matrix is the "super"-symmetric matrix of the following form. This type of matrix is the main member of the family of 1-generic matrices

$$H = \begin{pmatrix} x_1 & x_2 & \dots & x_{m-1} & x_m \\ x_2 & x_3 & \dots & x_m & x_{m+1} \\ \vdots & \vdots & \dots & \vdots & \\ x_{m-1} & x_m & \dots & x_{2m-3} & x_{2m-2} \\ x_m & x_{m+1} & \dots & x_{2m-2} & x_{2m-1} \end{pmatrix}.$$

The main question that we address is: A minimal reduction of sub-maximal minors of H is the gradient ideal of the determinant. We also determine the reduction number associated to gradient ideal, which is m-2. We leave an open question regarding reduction ideals of degenerations of these ideals. By degeneration of the Hankel matrix we mean to set all last r variables zero, whenever $1 \leq r < m-1$.

Throughout one deals with the effect of the degenerateness on the numerical invariants and ideal theoretic properties of the gradient ideal of f and submaximal minors. We show that in the degenerated case the gradient ideal is never a minimal reduction and when $r = m-2$ is of linear type.

This talk is based on a joint work with L. Cunha, Z. Ramos and A. Simis.