Derived Matroids

王歲杰

湖南大學

At the Bowdoin College Summer 1971 NSF Conference on Combinatorics, Gian-Carlo Rota posed the following question: The minimal dependent sets of vectors in a space V may be regarded as a vectors in the derived space δV over the same filed by using the vectors of V as a basis for δV. "Can this same sort of process be applied to the dependent sets of a matroid $\mathcal{M}$ to investigate the dependencies among dependencies?" "If so, what properties does δM, the derived matroid process?"

In this talk, we will explore the derived matroids and derived sequences of representable matroids under given representations. Firstly, the derived sequences are classified into three types: finite, cyclic, and divergent, which are completely characterized. Secondly, we determine all representable matroids whose derived matroids and dual matroids are isomorphic. Finally, as applications, the flats of the derived matroid give a classification on the translation deformations of hyperplane arrangements.

(joint work with Beifang Chen, Houshan Fu, and James Oxley)