Guangzhou Discrete Mathematics Seminar

k-zero-divisor hypergraphs

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Graph structures and algebraic structures are related; that is, a *zero-divisor graph*. In master thesis, we generalized the idea of a zero-divisor graph into a *k-zero-divisor hypergraph* including the vertex set $Z(R,k)$, the set of all k-zero-divisors of R where $k \geq 2$. A subset $\{a_1, a_2, a_3, \ldots, a_k\}$ of $Z(R,k)$ is an (hyper)edge if and only if (i) $a_1a_2a_3\cdots a_k = 0$ and (ii) the products of all elements of any $(k-1)$-subsets of $\{a_1, a_2, a_3, \ldots, a_k\}$ are nonzero. We provided (i) a necessary condition of commutative rings that implies the completeness of their k-zero-divisor hypergraphs; (ii) a necessary condition of commutative rings that implies the ability to partition their set of all k-zero-divisors into k partite sets and the completeness of that k-partite k-zero-divisor hypergraphs; and (iii) a necessary condition of commutative rings that implies the ability to partition their set of all σ-zero-divisors into k partite sets, for some integer $\sigma \geq k$. Moreover, we determined its diameter and minimum length of all cycles. Recently, we have been interested in the vertex-pursuit game played on hypergraphs.