

## Zero-Sum Flows on Graphs and Designs

**Alireza Mofidi**

*IPM & Tarbiat Modares University*

*Iran*

For an undirected graph  $G$ , a *zero-sum flow* is an assignment of non-zero real numbers to the edges, such that the sum of the values of all edges incident with each vertex is zero. By a zero-sum  $k$ -flow on a graph we mean a zero-sum flow with assignments from  $\{\pm 1, \pm 2, \dots, \pm(k-1)\}$ . It has been conjectured that if a graph  $G$  has a zero-sum flow, then it has a zero-sum 6-flow. We generalize the concept of zero-sum flows to 2-designs. More precisely, by a *zero-sum flow* for a 2-design, we mean a nowhere-zero vector in the null space of its incidence matrix. We show that every non-symmetric 2-design admits a zero-sum flow.

Joint work with S. Akbari and G.B. Khosrovshahi.