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Talk A medley of group actions pp.: 1–5

A medley of group actions*

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Abstract

Most of my interaction and collaborative research with Iranian mathematicians has been linked with symmetric structures, and has involved group actions. The lecture will be a tribute to my Iranian colleagues.

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1 My first visit to Iran

My first mathematical colleague from Iran was Dr Akbar Hassani, who had been a graduate student with me in Oxford. His sabbatical leave spent at the University of Western Australia in 1986 led to my first visit to Tehran in 1994. Dr Hassani worked in Perth with me and Dr Luz Nochefranca on 2-arc transitive graphs.

Definition 1.1. A graph Γ is $(G,2)$-*arc-transitive*, for some subgroup G of automorphisms, if G is transitive on all vertex triples (α,β,γ) such that $\{\alpha,\beta\}$ and $\{\beta,\gamma\}$ are both edges and $\alpha \neq \gamma$.

Previous work of mine had shown that every non-bipartite $(G,2)$-arc transitive graph is a normal cover of a basic one where the group G has a special from. Hassani, Luz and I classified all possible basic examples for an infinite family of almost simple groups G.

Theorem 1.2. *[1] All $(G,2)$-arc-transitive graphs such that $\mathrm{PSL}(2,q) \leq G \leq \mathrm{P\Gamma L}(2,q)$ are known.*

My lecture course in Tehran in 1994 was on the movement and separation of subsets under group actions, and some open problems on this theme became the topic of the PhD thesis for Mehdi Khayaty, now Professor Mehdi Alaeiyan.

Definition 1.3. Let G be a permutation group on a finite set Ω such that G has no fixed points in Ω, and let $\Gamma \subseteq \Omega$. The *movement of* Γ is $\mathrm{move}(\Gamma) = \max_{g\in G} |\Gamma^g \setminus \Gamma|$, and the *movement of* G is the maximum value of $\mathrm{move}(\Gamma)$ over all subsets Γ.

*Will be presented in English
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