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论文

有循环极大子群的素数幂阶群的作用是边传递的图(Ⅰ)

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摘要 ${\it \Gamma}$是一个有限的、单的、无向的且无孤立点的图,

G是${\rm Aut}({\it \Gamma})$的一个子群. 如果G在${\it \Gamma}$

的边集合上传递,则称${\it \Gamma}$是$G-$边传递图.

我们完全分类了当G为一个有循环的极大子群的

素数幂阶群时的$G-$边传递图. 这扩展了Sander的结果. 本文仅给出其中的一种情况,

即当G同构于群$\langle x, \ a \ | \ x^p=1=a^{p^{n-1}},

a^x=a^{1+p^{n-2}}\rangle$, $ n\geq 3$时,所有的$G$—边传递图.

结果为

${\it \Gamma}$是$G-$边传递的当且仅当${\it \Gamma}$为下列图之一 \\

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(1) \ \ ${\it \Gamma}\cong 2^{n-2}K_{1,1}$ \ $(n\geq 3)$;\\indent

(2) \ \ ${\it \Gamma}\cong p^kC_{p^{n-1-k}}$ \ $(p\neq 2,\ 1\leq k\leq

n-2;\ p=2,\ n\geq 4,\ 1\leq k\leq n-3; \ p=2, \ n=3, \ k=0)$; \\indent

(3) \ \ ${\it \Gamma}\cong {\it \Gamma}_* =\bigcup\limits_{i=1}^{p}

C^i_{p^{n-1}}$,

$C^i_{p^{n-1}}\cong C_{p^{n-1}}$;\\

\indent

(4) \ \ ${\it \Gamma}\cong p^kC_{p^{n-k}}$ \ $(p>2,\ 1\leq k\leq n-1;\

p=2,\ 1\leq k \leq n-2)$;\\indent

(5) \ \ ${\it \Gamma}\cong p^{k+1}K_{1,p^{n-1-k}}$ \ $(0\leq k\leq n-1)$;\\indent

(6) \ \ ${\it \Gamma}\cong p^kK_{p,p^{n-1-k}}$ \ $(0\leq k\leq n-1)$;\\indent

(7) \ \ ${\it \Gamma}\cong K_{1,p^n}$;\\indent

(8) \ \ ${\it \Gamma}\cong p^kK_{1,p^{n-1-k}}$ \ $(0\leq k\leq n-1)$.

关键词 图 自同构群 边传递

分类号

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GRAPHS ON WHICH A GROUP OF PRIME POWER ORDER WITH A CYCLIC MAXIMAL SUBGROUP ACTS EDGE-TRANSITIVELY(I)

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Abstract Let ${\it \Gamma}$ be a finite simple undirected graph with no isolated vertices , G is a subgroup of ${\rm Aut}({\it \Gamma})$. The graph ${\it \Gamma}$ is said to be G-edge transitive if G is transitive on the set of edges of ${\it \Gamma}$. We obtain a complete classification of $G-$edge transitive graphs , which G is a group of prime-power order with a cyclic maximal subgroup. This extend Sander's conclusion. In this paper, we only consider the case that G is isomorphic to group $\langle x, \ a \ \big| \ x^p=1=a^{p^{n-1}}, \ a^x=a^{1+p^{n-2}}\rangle,$ $n\geq 3$. Then ${\it \Gamma}$ is $G-$edge-transitive if and only if ${\it \Gamma}$ is one of following graphs (1) \ \ ${\it \Gamma}\cong 2^{n-2}K_{1,1}$ \ $(n\geq 3)$; (2) \ \ ${\it \Gamma}\cong p^kC_{p^{n-1-k}}$ \ $(p\neq 2,\ 1\leq k\leq n-2;\ p=2,\ n\geq 4,\ 1 \leq k\leq n-3; \ p=2, \ n=3, \ k=0)$; (3) \ \ ${\it \Gamma}\cong {\it \Gamma}_* =\bigcup\limits_{i=1}^{p}C^i_{p^{n-1}}$, \ $C^i_{p^{n-1}}\cong C_{p^{n-1}}$; (4) \ \ ${\it \Gamma}\cong p^kC_{p^{n-k}}$ \ $(p>2,\ 1\leq k\leq n-1;\ p=2,\ 1 \leq k \leq n-2)$; (5) \ \ ${\it \Gamma}\cong p^{k+1}K_{1,p^{n-1-k}}$ \ $(0\leq k\leq n-1)$; (6) \ \ ${\it \Gamma}\cong p^kK_{p,p^{n-1-k}}$ \ $(0\leq k\leq n-1)$; (7) \ \ ${\it \Gamma}\cong K_{1,p^n}$; (8) \ \ ${\it \Gamma}\cong p^kK_{1,p^{n-1-k}}$ \ $(0\leq k\leq n-1)$.

Key words Graph automorphism group edge-transitive

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