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Fissioned triangular schemes via sharply 3-transitive groups

Jianmin Ma, Kaishun Wang

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n [D. de Caen, E.R. van Dam. Fissioned triangular schemes via the cross-ratio, {Europ. J. Combin.}, 22 (2001) 297-301], de Caen and van Dam constructed a fission scheme $FT(q+1)$ of the triangular scheme on $\PG(1,q)$. This fission scheme comes from the naturally induced action of $\PGL(2,q)$ on the 2-element subsets of $\PG(1,q)$. The group $\PGL(2,q)$ is one of two infinite families of finite sharply 3-transitive groups. The other such family $Mq(q)$ is a "twisted" version of $\PGL(2,q)$, where q is an even power of an odd prime. The group $\PSL(2,q)$ is the intersection of $\PGL(2,q)$ and $Mq(q)$. In this paper, we investigate the association schemes coming from the actions of $\PSL(2,q)$, $Mq(q)$ and $\PML(2,q)$, respectively. Through the conic model introduced in [H.D.L. Hollmann, Q. Xiang. Association schemes from the actions of $\PGL(2, q)$ fixing a nonsingular conic, {J. Algebraic Combin.}, 24 (2006) 157-193], we introduce an embedding of $\PML(2,q)$ into $\PML(3,q)$. For each of the three groups mentioned above, this embedding produces two more isomorphic association schemes: one on hyperbolic lines and the other on hyperbolic points (via a null parity) in a 3-dimensional orthogonal geometry. This embedding enables us to treat these three isomorphic association schemes simultaneously.

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