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Non-crossing Partition Lattices in Finite Real Reflection Groups

Colum Watt
Dublin Institute of Technology, colum.watt@dit.ie

Thomas Brady
Dublin City University, thomas.brady@dcu.ie

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LATTICES IN FINITE REAL REFLECTION GROUPS
THOMAS BRADY AND COLUM WATT

Abstract. For a finite real reflection group $W$ with Coxeter element $\gamma$ we give a case-free proof that the closed interval, $[I, \gamma]$, forms a lattice in the partial order on $W$ induced by reflection length. Key to this is the construction of an isomorphic lattice of spherical simplicial complexes. We also prove that the greatest element in this latter lattice embeds in the type $W$ simplicial generalised associahedron, and use this fact to give a new proof that the geometric realisation of this associahedron is a sphere.


References


School of Mathematical Sciences, Dublin City University, Glasnevin, Dublin 9, Ireland
E-mail address: tom.brady@dcu.ie

School of Mathematical Sciences, Dublin Institute of Technology, Kevin St., Dublin 8, Ireland
E-mail address: colum.watt@dit.ie