# k-plurisubharmonic functions and low dimensional actions

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A group $G$ has Serre's property $FA$ if every action of $G$ on a tree has a global fixed point. It is well known that groups with property $(T)$ have property $FA$. There is a natural generalization of property $FA$ to higher dimensional actions on simplicial complexes, called property $FA_r$ where one requires that any action on an $r$-dimensional $CAT(0)$ simplicial complex has a global fixed point. Farb proved that $SL_n(\mathbb{Z})$ enjoys property $FA_{n-1}$, but it remains elusive for other higher rank lattices. In a joint work with Ben Lowe, we develop a new method for establishing property $FA_r$, using $k$-plurisubharminic functions constructed using Patterson-Sullivan measures. As a consequence we show that any cocompact lattice in $SL_n(\mathbb{R})$ has property $FA_{[n/8]}$ and lattices in the exceptional rank one group $F_4^{(-20)}$ have property $FA_2$.