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Diameters of the Commuting Graphs of Simple Lie Algebras

Let L be a Lie algebra with center $Z(L)$. The commuting graph $\Gamma(L)$ of L is a graph with vertex set $L \setminus Z(L)$, two distinct vertices x and y are adjacent if and only if x and y commute, i.e., $[x, y] = 0$. Let $\mathfrak{g}$ be a finite-dimensional simple Lie algebra over an algebraically closed field of characteristic zero. In this paper, we study the diameter of $\Gamma(\mathfrak{g})$.