Let $G$ be a finite primitive permutation group on a set $\Omega$. If $x \in G$, define $\text{ind } x = |\Omega| - \text{orb } x$, where $\text{orb } x$ is the number of orbits of $\langle x \rangle$ on $\Omega$. Suppose that $G$ contains elements $x_1, \ldots, x_r$ such that $< x_1, \ldots, x_r > = G$, $x_1 \cdots x_r = 1$ and $\sum i \text{nd } x_i = 2(n - 1)$, where $x_i \neq 1$ for $i = 1, \ldots, r$. Then $G$ is called a primitive group of genus 0. Such groups arise as monodromy groups of compact connected Riemann surfaces. It seems reasonable to conjecture that they have a finite set of non-isomorphic composition factors which are neither cyclic nor alternating. The paper under review is a contribution toward a proof of this conjecture using the classification theorem for finite simple groups together with the theorem of M. Aschbacher and L. Scott [AS], J. Algebra 92, No.1, 44-80 (1985; Zbl 0549.20011).

Suppose $G$ is a primitive group of genus 0 and $H$ is a stabilizer of a point. Let $Q$ be a minimal normal subgroup of $G$. Then by [AS] $G = HQ$ and precisely one of the five possibilities (A), (B), (C1), (C2), (C3) holds for $G, H, Q$. M. Aschbacher and S. Shih [not yet published] have proved the conjecture in the cases (C2) and (B). The object of the paper under review is to study completely the case (A) where $Q$ is an elementary Abelian group (Theorem A) and to prove in case (C1) the nonexistence of primitive groups of genus 0 (Theorem C1). Also some restrictions for composition factors of $G$ in case (C3) are proved. In particular, it’s proved Corollary F. If $p$ is a prime $> 341$, then $L_2(p)$ is not a composition factor of any group of genus 0.

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paper as accurately as possible without claiming the completeness or perfect precision of the matching.