

# Bounding the maximum number of cycles in a graph with $p$ vertices and $q$ edges

Robert E.L. Aldred  
University of Otago  
New Zealand

## Abstract

Let  $G$  be a connected graph with  $p$  vertices and  $q$  edges and define the parameter  $r = q - p + 1$ . Denote by  $\Psi(r)$  the maximum number of cycles in such a graph. In 1981 it was noted by Entringer and Slater that the dimension of the cycle space of such a graph is known to be  $2^r$  and consequently,  $\Psi(r) \leq 2^r - 1$ . In the same paper, the Möbius ladders were used to show  $\Psi(r) \geq 2^{r-1} + r^2 - 3r + 3$ . At the time it was conjectured that the true value of  $\Psi(r)$  should be closer to the latter bound. We discuss these bounds and some recent progress in the general case along with an effective resolution of the conjecture for planar graphs.