

# Singular Distance Powers of Circuits

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## Abstract

In this work a precise condition for the singularity of a circuit distance power  $C_n^{(d)}$  is derived. Namely, either  $n$  and  $d$  are not relatively prime or the order of 2 in  $d + 1$  is strictly smaller than in  $n$ . It is also shown that the simple eigenvalues of circuit distance powers are contained in  $\{-2, 0, 2d\}$ , generalizing a well-known result for circuits. Further, the nullity of  $C_n^{(d)}$  is calculated.

**Keywords:** circuit, distance power, singularity, nullity

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