

Complete classification scheme for the distribution of trinomial zeros with respect to their moduli

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Abstract. The paper discusses the location of zeros of a real trinomial with respect to their moduli. Although this problem was solved in classical and modern literature, a complete answer to the problem is still missing. Without loss of generality, we consider the unitary modulus and derive a comprehensive classification scheme representing a one-to-one correspondence between given configurations of zeros and appropriate parts of the parameter space. Doing this, explicit formulae for the numbers of zeros with a modulus greater than, equal to, or less than 1 are presented. Conversely, for prescribed counts of such zeros, appropriate regions in the parameter space are described analytically. Also, basic properties of these regions are discussed, including implicit and parametric forms of curves separating these regions.

As a basic proof technique, the D -partition method is used and supported by analytical tools, and by an extended version of a classical result from the elementary number theory. The derived classification results are illustrated by several examples and comparisons with the existing results.

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