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*Zero-free polynomial approximation on trees of Jordan domains*

By a polynomial approximation set we understand a compact subset of the complex plane on which every function plausibly approximable by polynomials is indeed approximable by polynomials. The famous theorem of Sergei Mergelyan asserts that a compact set is a polynomial approximation set if and only if its complement is connected. If  $A$  and  $B$  are compact connected sets with connected complements, we show that  $A \cup B$  has connected complement if and only if  $A \cap B$  is connected. As a corollary, we have a characterization of connected polynomial approximation sets for which the union is also a polynomial approximation set. These results are applied to the problem of approximating a function having no zeros on the interior of a set by polynomials having no zeros on the set. The latter problem is related to the universality of the Riemann zeta-function. This is joint work with Johan Andersson (Stockholm University) and extends joint work with Greg Knese (University of Alabama).