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On primitivity and vanishing of Dirichlet series

For a rational valued periodic function, we associate a Dirichlet series and provide a new necessary and sufficient condition for the vanishing of this Dirichlet series specialized at positive integers. This question was initiated by Chowla, and carried out by Okada for a particular infinite sum. Our approach relies on the decomposition of the Dirichlet characters in terms of primitive characters. Using our approach, we find some new family of natural numbers for which a conjecture of Erdős holds and provide some other applications.