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Cycles of Sums of Integers,

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Abstract

We study the period of the linear map $T : \mathbb{Z}_m^n \rightarrow \mathbb{Z}_m^n : (a_0, \dots, a_{n-1}) \mapsto (a_0 + a_1, \dots, a_{n-1} + a_0)$ as a function of m and n , where \mathbb{Z}_m stands for the ring of integers modulo m . Because this map is a variant of the Ducci sequence, several known results are adapted in the context of T . The main theorem of this paper states that the period modulo m can be deduced from the prime factorization of m and the periods of its prime factors. We also characterize the tuples that belong to a cycle when m is prime.