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Abstract

We find (non-regular) continued fraction expansions for infinite reciprocal sums of Fibonacci and Lucas numbers. We give continued fraction expansions of some more related series. Moreover, we prove that Fibonacci and Lucas Dirichlet series like $\sum_{n=1}^{\infty} 1/F_n^s$ define hyper-transcendental functions, and we investigate the approximates of the series modulo positive integers.