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Abstract

For integers $m \geq 0$ and $k \geq 2$, set $\alpha_{m,k} := \sum_{n=1}^{\infty} \frac{n^m F_n^{(k)}}{2^{n+k-1}}$, where $F_n^{(k)}$ is the Fibonacci sequence of order k or k-generalized Fibonacci sequence. It is shown that $\alpha_{0,k} = 1$, $\alpha_{1,k} = 2^{k+1} - k - 1$, $\alpha_{2,k} = 2^{k+1}(2^{k+2} - 4k - 3) + k^2 + 2k - 1$, and $\alpha_{m,k} = 1 + \sum_{r=0}^{m-1} \binom{m}{r} \sum_{i=1}^{k} 2^{k-i} i^{m-r} \alpha_{r,k}$, which generalize recent results on weighted Fibonacci sums by Benjamin, Neer, Otero, and Sellers.