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## Some summation identities for Fibonacci quaternions and Hyper-Fibonacci quaternions\*

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**Abstract.** In this paper, we derive new summation identities involving the (products of) Fibonacci quaternions by the method of summation-by-parts. We apply our method to derive summation identities which involve the (products of) hyperFibonacci quaternions. By using the method of generating functions, we derive convolution-sum identities for the Fibonacci quaternions. Finally, we derive binomial-sum identities for the Fibonacci quaternions by matrix method.

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**Keywords:** Fibonacci sequence, Fibonacci quaternions, summation identity, binomial-sum identity

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