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*An exact power series representation of the Baker-Campbell-Hausdorff formula*

The Baker-Campbell-Hausdorff formula is well known and given by $Z = \log(e^X e^Y) = X + Y + \frac{1}{2}[X,Y] + \frac{1}{12}[X,[X,Y] + \frac{1}{12}[Y,[Y,X]] + \cdots$, where it is not obvious what the dots represent. Considering the symmetric form of this formula, namely $S(A,B) = \log(e^{A/2} e^B e^{A/2})$, we find an exact power series representation in the matrix $B$. We find closed form $A$-dependent coefficients in the form of hyperbolic functions for all orders of $B$. Each of these coefficients represent an infinite number of terms in the original expansion, making truncation of the series much more controllable for small $B$ but arbitrary $A$.