

Fourier series summation and A.N. Krylov convergence acceleration in CAS

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Abstract. The summation of Fourier series in finite terms is considered. First at all, we want to present some results about testing standard instruments for calculating of infinite sums in modern CAS. They work over the field of complex numbers and, in the case of Fourier series, sometimes this lead to strange forms for symbolic representation of sums.

Then we want suggest an alternative approach to the summation of Fourier series, based on a method, proposed by A.N. Krylov for the acceleration of Fourier series convergence. We consider examples of Fourier series from mathematical physics related to the wave equation, and especially the Green's functions of a finite string. Sometimes, and for several Green's functions especially this approach give zero expression instead of a fast convergence Fourier series. This means in our viewpoint that we find the summation of Fourier series in finite terms. In this case, it is supposed to use the field of real numbers. The advantages and difficulties of both approaches and their implementation in CAS are discussed.

References

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