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Multiple Fourier series of some radial functions and lattice point problems

For the multiple Fourier series of radial functions, we investigate the behavior of the spherical partial sum. We show convergence properties and singular phenomena for the multiple Fourier series. As singular phenomena, we show the Gibbs-Wilbraham phenomenon, the Pinsky phenomenon and the third phenomenon. The third phenomenon is closely related to the lattice point problems, which is a classical theme of the analytic number theory. Our results on the convergence of the Fourier series are obtained by using the best estimates up to now on lattice point problems. Therefore, if the lattice point problems will be improved in the future, then our results can be also improved.

This is a joint work with Professor Shigehiko Kuratsubo (Hirosaki University).