

Possibility of real-time analysis for head echo observation by the MU rader: Fourier imaging with GPU

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Fourier imaging can reveal luminance distribution by correlation of interferometers. It is named an aperture synthesis method at radio astronomy, and often used to derive a high-resolution image from interferometers. And it is used on a magnetic resonance imaging. So this method can distinguish multiple objects at a time, we confirmed the accuracy of meteor trail analysis has been increased.

The largest problem of this technique is long calculating time.

Though it is not necessary to image whole observation time at head echo observation, this imaging took about 10 times as long as real time when we use recent CPU. In recent years the number of interferometers is increasing, it is necessary to calculate more quickly. We attempted speeding up with GPU.

GPU is an expansion board that calculates vector processing quickly for gaming. GPU can calculate some numerical calculation more quickly and its cost is lower in comparison to the case using CPU. There are several reports says GPU can execute fluid calculation several ten times as fast as CPU do, but some reports says GPU executes FFT only a few times faster at. Trying a Fourier imaging with GPU, we established the record GPU calculated about thousand times faster than CPU. The execution time was only a few milliseconds, so this result indicates that we are able to pursue meteors at real time.

At this presentation we will explain why so fast GPU can calculate referring to the feature of GPU, and explain the possibility of realizing some techniques using real time imaging.

Keywords: MU radar, Fourier imaging, aperture synthesis, GPGPU, interferometer