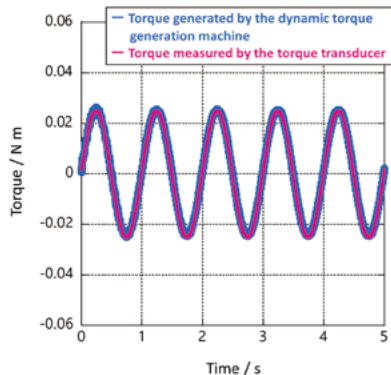


# Development of a dynamic torque generation machine for the establishment of dynamic torque calibration technology

HAMAJI Misaki

In recent years, the demand for the precision measurement of torque with time variation (dynamic torque) has increased for the performance evaluation of engines and motors. However, dead-weight-type torque standard machines that have supplied torque standards as national standards are not suitable for precisely measuring dynamic torque, because these machines use gravity to generate torque. Therefore, in this pioneering research, we developed a new machine that can generate dynamic torque traceable to the International System of Units (SI) by using the principle of torque generation through electromagnetic force, instead of gravity (the left figure).

This system generates torque by applying an electric current to a coil installed in a uniform magnetic field. The generated torque can be changed dynamically by altering the applied electric current. By connecting a torque transducer for measuring generated dynamic torque to the coil and synchronously measuring the applied electric current and output of the torque transducer, the dynamic characteristics of the torque transducer can be evaluated.



Measurement of dynamic torque generated by dynamic torque generation machine.

For the first time, a sinusoidal dynamic torque of approximately 1 Hz traceable to the SI was successfully generated using an electromagnetic force (the right figure). The relative expanded uncertainty of the dynamic torque generated by this machine was evaluated to be 0.29 %. In the future, we will contribute to developing precise measurement technology and establishing calibration technology for dynamic torque by further expanding the torque and frequency ranges.

## References:

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