

## Current status and issues of grain-size analysis using a digital image method and a laser diffraction method for sedimen

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Grain size measurement is the most fundamental physical information in evaluating the characteristics of various materials, the analytical technology. These are JIS standardized clearly by the association of powder process industry and engineering, Japan. In geomorphological field, we are carried out the grain size analysis of volcanic ash, mud, sand, and gravel using in combination of settling tube method, laser diffraction scattering method (LD), sieve classification method and the precipitation method in generally. According to currently technology, it is possible that the LD of each company to measure the particles of a wide range of 10nm to 3mm in a short period. However, we believe that a technical problem for analyzing nature sediments still now because these are not a powder of industrial products with same physical properties.

For example, we know a large scattered light intensity can be achieved in the shorter wavelength of the incident light because it is confirmed by measurement of the fine particles of submicron order, strength is not enough laser light. Moreover backscatter increases depending on the shape of non-spherical particles, tend to shift the fine particle side is confirmed grain size. Further, when using an algorithm for determining the particle size by inverse calculation using the Mie theory, it is necessary to set the user side of the value of the absorption coefficient and the particle refractive index.

This assumption is a very annoying problem for the user.

Recently, the particle size measurement in the field of powder technology, the development of new analytical instruments using digital image analysis method has been increasing. In this method, it is acquired the two-dimensional image of the particle is first digitally imaged by pixel division using the CCD camera and divided into two sub-methods, static (JIS Z 8827-1:2008; ISO 13322-1) and dynamic (JIS Z 8827-2:2010; ISO 13322-2). The methods may be used either, a process that takes as a digital image the particles, the statistical processing on a personal computer is the same.

Analysis method using a digital image of a single particle is clear, it is easy to be trusted from the user side. In addition, the use of the digital image, various particle shape parameter as well as information about the particle size distribution and the particle size of each definition different, for example, can be analyzed at the same time the value aspect ratio, elongation, circularity, HS circularity, convexity, solidity, etc.. Further, it is possible to obtain also the physical properties such as transmittance and intensity. We believe that it is analyzed in conjunction with the particle size measurement result data on physical properties and particle shape these, and becoming a new standard for particle size analysis in the future.

The present study includes the result of "Research and Development of Margin Assessment Methodology of Decay Heat Removal Function against External Hazards" entrusted to Japan Atomic Energy Agency by the Ministry of Education, Culture, Sports, Science and Technology of Japan (MEXT).

Keywords: laser diffraction method, digital image method, sediment, grain-size analysis, current status, issues