Name	Job Title	Area of Expertise
SASAKI Kenji	Associate Professor	Concrete Engineering

1. Main Research Topics

We are engaged in research on material and construction performance evaluation for enhancing the quality and productivity of concrete structures, developing low-carbon construction materials, and preserving historical structures.

Our research addresses each stage of concrete structures−from design and construction to maintenance and use−focusing on keywords such as "performance evaluation," "quality improvement," "extended service life," and "productivity enhancement." Furthermore, Nagasaki boasts numerous concrete structures recognized as historical assets, including Gunkanjima (Battleship Island) and atomic bomb ruins. We are also engaged in research aimed at their preservation and utilization.

① Evaluation of material and construction performance of various concrete capable of contributing to improving quality and productivity

Efforts are underway to utilize fly ash and crushed sand in concrete structures from perspectives such as extending service life, reducing environmental impact, effectively utilizing industrial by-products, and making effective use of locally sourced materials. However, to incorporate materials with limited or no usage history into concrete, it is essential to establish material and mix design methodologies while clearly defining construction performance and hardening characteristics (strength, shrinkage, durability, etc.). This research evaluates the effectiveness of fly ash blended with blast furnace cement in suppressing temperature cracking and improving durability in concrete. It also assesses the workability when crushed sand is used as fine aggregate. Furthermore, the research focuses on visualizing the concrete construction process using IoT sensors and developing methods to enhance the surface quality of concrete based on this visualization.

② Development of Low-Carbon Construction Materials

Concrete has been considered a material with a high environmental impact because the production of cement, its main constituent material, emits large amounts of CO_2. On the other hand, cementitious materials contain large amounts of calcium-based hydrates that react with CO_2, leading to their reevaluation as materials with high CO_2 fixation potential. Efforts to utilize them are actively underway. In this research, we are working on quality evaluation of low CO_2 emission concrete, establishing manufacturing methods for recycled aggregates and artificial crushed stone aimed at maximizing CO_2 fixation, and quality evaluation of concrete using CO_2 fixation materials.

③ Study on assessment of present situation and conservation method of historical concrete structures

To preserve structures of historical and cultural value, it is essential to accurately assess their current condition, elucidate the mechanisms of deterioration onset and progression, and establish highly effective preservation methods. This research focuses on evaluating the current material and structural integrity of historical structures on Hashima Island, such as revetment structures, production facilities, and residential facilities, to preserve and utilize them as cultural properties and World Heritage sites. It also involves assessing the performance of repair and reinforcement materials and examining repair and reinforcement methods that aim to balance authenticity preservation with effective conservation

2. Keywords

Concrete, Performance evaluation, Quality improvement, Service life extension, Productivity improvement, IoT sensors, Low-carbonization, Carbon neutrality, White carbon, Continuous fiber reinforcement, Historical structure

3. Remarks and Websites

We are available for collaborative research on concrete material and construction performance evaluation, development of low-carbon construction materials, application of new materials to concrete structures, and maintenance of concrete structures.

If you have any challenges related to the planning, design, construction, or maintenance of concrete structures, please feel free to contact us.

researchmap: https://researchmap.jp/concrete_kenjisasaki
Laboratory: https://www.st.nagasaki-u.ac.jp/laboratories/sasaki/