

A Study on Parameter of Steel Strain of Precast Reinforced Concrete with Joint

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Abstract

Currently, the fabricated precast concrete construction is actively applied. It constructs a number of modules to complete the structural member, resulting joint occurs between each module. These connections need to identify its behaviour due to safety and serviceability. However, the prediction accuracy of deflection is not guaranteed. Because of the traditional methods cannot be reflected characteristics of an initial crack of the joint interface and difference of strength of grouting materials. Therefore, a new proposal for deflection evaluation is required to reflect the joint characteristics of precast flexural member. In this study, the mean steel strain characteristics were analysed for three variables; load, concrete compressive strength and rebar ratio. In the result, mean steel strain of rebar is proportional to load and inversely proportional to concrete compressive strength and rebar ratio.

Keywords: precast concrete; prefabricated construct; joint; deflection; mean steel strain; tension stiffening effect; curvature; load; concrete compressive strength; rebar ratio.

1 Introduction

Given the urgent requirement to replace and rebuild aging structures in the world, construction methods using the prefabricated precast concrete construction technique are actively being studied and applied to minimize the environmental impacts and traffic congestion in urban areas during the construction or replacement of such structures. Such prefabricated construction methods are being applied to various cases, beginning with the standard structures, such as regular buildings. In the case of bridges, it is being applied as part of the researches for accelerated

construction, which is required to replace aging bridges or to construct new bridges in urban areas, with the “Accelerated Bridge Construction Project (ABC Project)” using prefabricated construction techniques in the United States being an example [1].

As a reinforced-concrete structure, the precast concrete structure should have sufficient flexural and shear strength to ensure the safety of the structure, and the criteria for cracking and deflection must be satisfied as well to ensure serviceability. The prefabricated precast concrete structure is constructed by assembling and connecting multiple modules such as slabs, walls,