

**COMPUTATIONAL MODELS FOR REINFORCED ULTRA HIGH-  
PERFORMANCE FIBER REINFORCED CONCRETE COLUMNS  
UNDER AXIAL LOAD.**

Final Project Report

As one of the requirements to receive bachelor degree  
of Universitas Atma Jaya Yogyakarta

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**INTERNATIONAL CIVIL ENGINEERING PROGRAM  
FACULTY OF ENGINEERING  
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2020**

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## DECLARATION

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## PREFACE

The research is one of the requirements of fulfilling bachelor's degree of Universitas Atma Jaya Yogyakarta. This research is finished under "3+2 Program" in Taiwan, where Universitas Atma Jaya Yogyakarta and National Cheng Kung University has an agreement and collaboration. The background of this research is to study and calibrate the behavior of UHPFRC column under axial load conducted by Sugano et al. in 2007 using a compression test by numerical simulation. The strength and confinement of concrete column will influence the compressive behavior of column. The study of concrete confinement and how it influences the behavior of column will be discussed in this report.

Chapter I of the report contains the introduction, research background, and scope and limitation. Chapter II is literature review about basic knowledge. Chapter III the methodology of this result. Chapter IV is the numerical simulation result and discussion. Chapter V contains conclusion and suggestion of this study. Author realizes that this report is not perfect and thus author apologizes sincerely.

Tainan, July 5th 2020

Author

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Sincerely authors give the praises and thanks to Jesus Christ, with all His Graces and Blessings, author finished this final report without any problems, in timely manner. Authors realize that this final report would not be done without the help from others. For that, author would like to thank these people mentioned below:

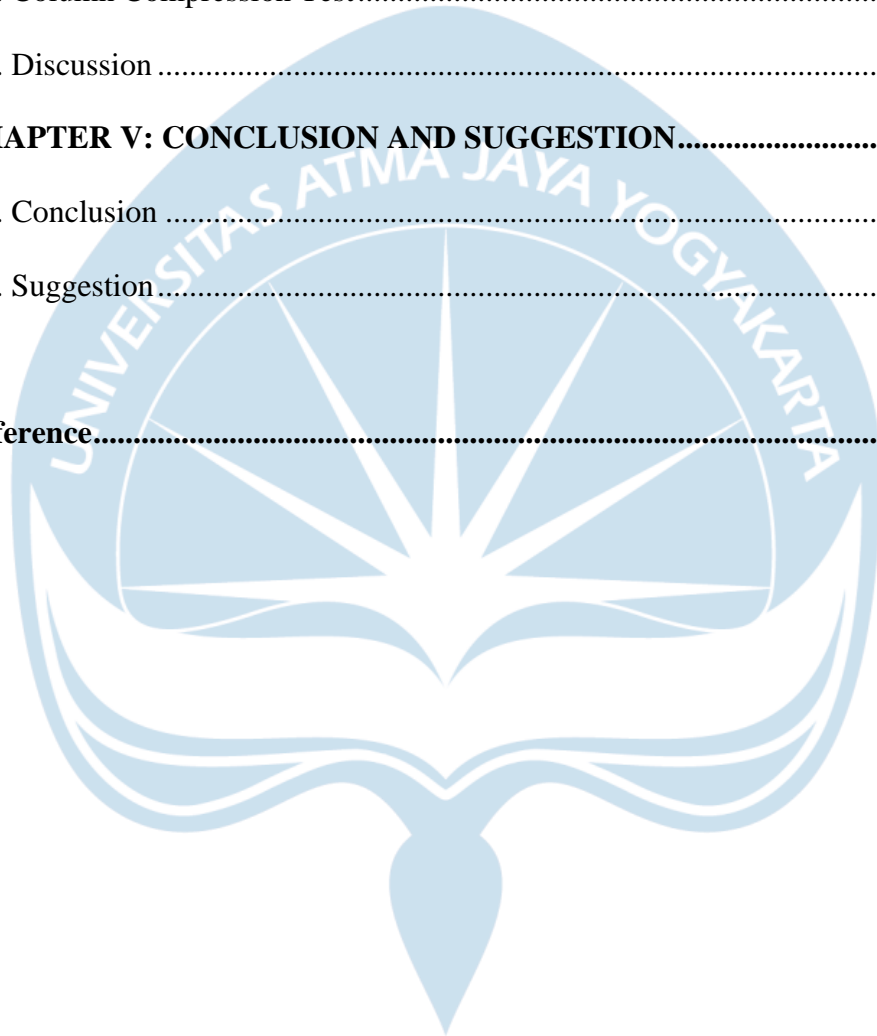
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## ABSTRACT

**COMPUTATIONAL MODELS FOR REINFORCED ULTRA HIGH-PERFORMANCE FIBER REINFORCED CONCRETE COLUMNS UNDER AXIAL LOAD.**, Christianus Bertho, Student Number 161316532, the Year 2020, Field of Specialization Structural and Material Engineering, International Civil Engineering Program, Faculty of Engineering, Universitas Atma Jaya Yogyakarta.

Reinforcing concrete is one of the most common of construction material for a building. These days a new generation of concrete known as Ultra High-Performance Fiber Reinforced Concrete (UHPFRC) has been discovered to the world. UHPFRC is not well known in Indonesia and just recently being study in Indonesia. It is important to know the behavior of this type of material, so in the future construction in Indonesia can use this type of concrete. UHPFRC is well known for its superior compressive strength and ductility. With higher compressive strength and ductility UHPFRC is more suitable for heavy loaded structural component such as column. The behavior of column under axial load is affected by the concrete strength and column steel reinforcement especially transverse reinforcement. The transverse reinforcement enhances the concrete core of column by confined it, making it have more strength and more ductility. Compressive test of column can also be done numerically by various finite element software. This study will perform computational model for UHPFRC column and calibrate the result with the experimental result performed by Sugano et al. in 2007. The computational model will be done in OpenSees Platform. Result indicates that the numerical model gives a good agreement with experimental data. There is still the need of development in the model to make the result closer to accuracy.

**Keyword:** UHPFRC, Column, Axial loading, Finite element method, Concrete confinement.