UF | Center for Infrastructure Protection and Physical Security (CIPPS)
UNIVERSITY of FLORIDA

DSTA Defence Science & Technology Agency

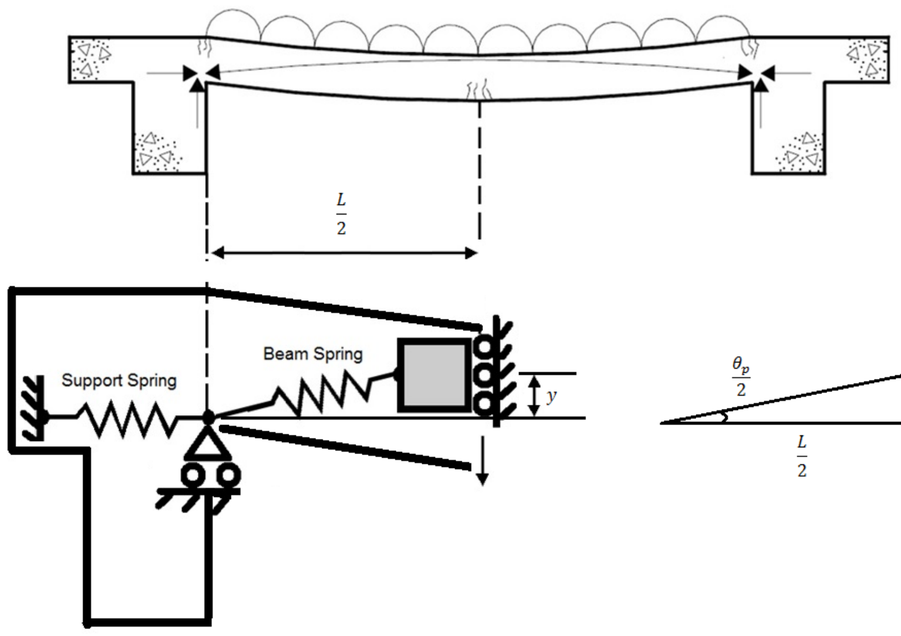
Resistance of Fully Restrained Reinforced Concrete Beams and One-Way Slabs

Introduction

A computationally efficient numerical procedure to compute the load-deflection curve (also the resistance) of fully restrained reinforced concrete beams and one-way slabs was implemented in a computer program and validated with experimental results. Effects of bond-slip, finite plastic hinge length, and membrane action were considered.

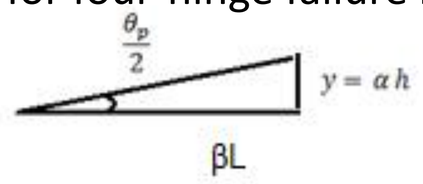
Two-spring model

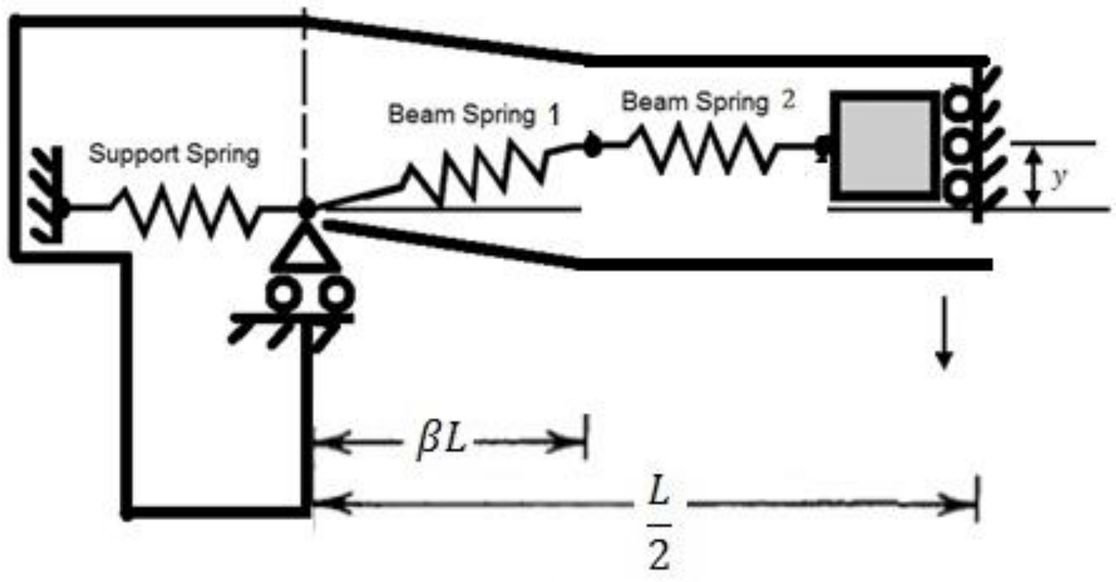
- Generates membrane force for each midspan deflection for three-hinge failure mechanism



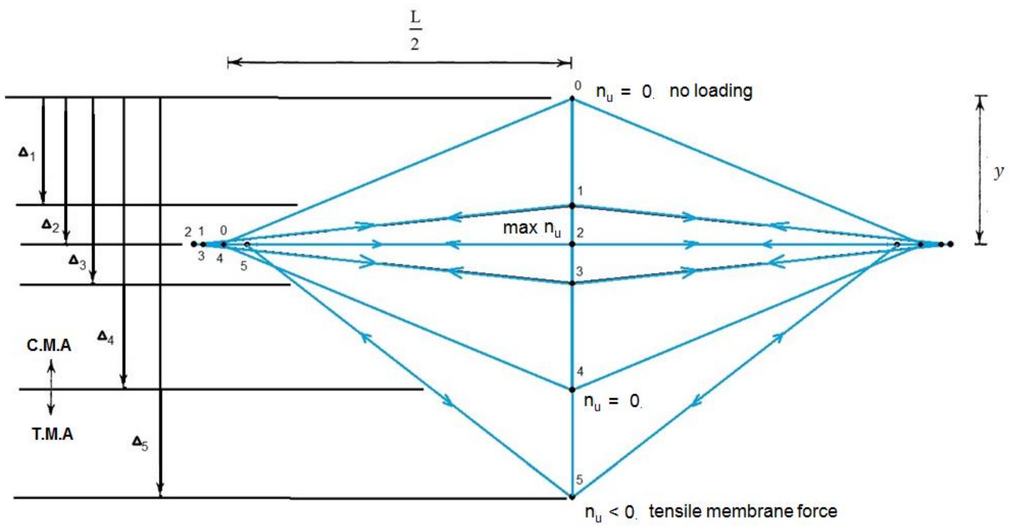
Three-spring model

- Generates membrane force for each midspan deflection for four-hinge failure mechanism

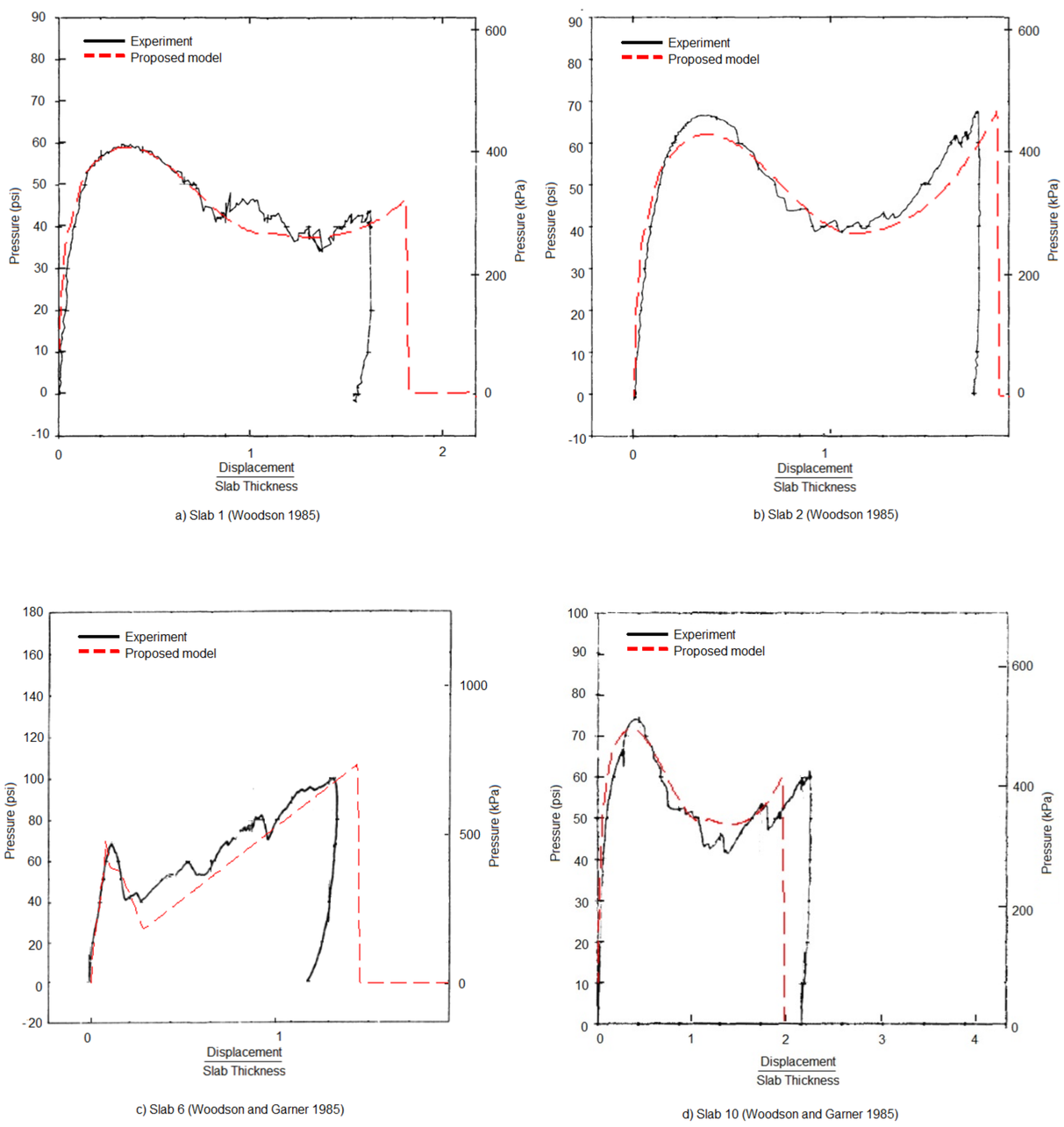




Transition from Compressive Membrane Action (CMA) to Tensile Membrane Action (TMA)

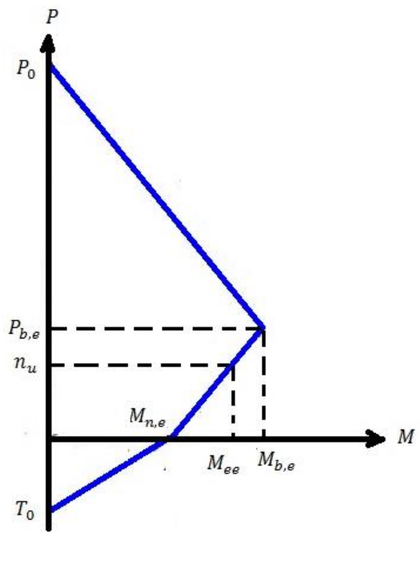


Validation with Experimental Data



Modified moment capacity

- Obtain modified moment capacity from membrane force generated by two-spring or three-spring model
- Obtain load capacity from modified moment capacity and moment from membrane force



Limitations

- Springs are linear elastic
- Shear was not considered
- Further study is required for deep slabs, two-way slabs, and partially restrained slabs