SEQUENTIAL AND SIMULTANEOUS ANALYSIS OF R.C. TALL BUILDINGS CONSIDERING CREEP AND SHRINKAGE

By

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As for our own faults, it could take a large slate to hold the account of them, but, thank God, we know where to take them, and how to get the better of them. With all our faults, God loves us still if we are trusting in His Son, therefore let us not be down hearted, but hope to live and learn, and do some good service before we die, Through the cart creaks it will get home with its load, and the old horse, broken kneed as he is; will do a sight of work yet. There's no use in lying down and doing nothing, because we cannot do everything as we should like. Faults or no faults, ploughing must be done, and imperfect people must do it too, or there will be no harvest next year; bad ploughman as john may be, the angels won't do his work for him, and so he is off to do it himself. Go along, Violet! Gee woa! Depper!

From C.H. Spurgeon's "John Ploughman's Talks", Baker Book House, Grand Rapids, Michigan

Dedicated To

- Him Who Is Perfect (God)
- My Dear Wife (Genet)

and

- My Sister (Sewnet)

Who was not able to see this thesis.

CERTIFICATE

This is to certify that the thesis entitled **"SEQUENTIAL AND SIMULTANEOUS ANALYSIS OF R.C. TALL BUILDINGS CONSIDERING CREEP AND SHRINKAGE"**, being submitted by **MR. MAKONNEN MASRESHA ASFAW** to the Indian Institute of Technology, Delhi, for the award of the degree of **DOCTOR OF PHILOSOPHY** in Civil Engineering is a record of bonafide research work carried out by him under my supervision and guidance. He has fulfilled the requirements for the submission of the thesis, which to the best of my knowledge has reached the requisite standard.

The material contained in this thesis has not been submitted, in part or in full to any other University or Institute for the award of any degree or diploma.

February, 1997

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MAKONNEN M. ASFAW

ABSTRACT

In the procedure available in literature for considering creep and shrinkage effects in concrete the shear action of beams is neglected and the effects of differing nature of application of dead load and live load is ignored. No procedure exists which takes in to account the sequential nature of application of dead load, simultaneous nature of application of live load, creep and shrinkage effects in concrete and shear actions of beams while evaluating creep deflections. The present work is devoted to the development of such a procedure, to the development of a software and to carrying out of numerical studies.

It is shown that the procedure available in literature gives satisfactory results when the beam shear stiffness is low but results in much erroneous results when beam shear stiffness is high. Since the above proposed procedure required considerable computational effort, an approximate procedure is also proposed when beam shear stiffness is high.

The structure parameters that affect creep and shrinkage behaviour of buildings are identified and extensive studies of the effect of these parameters on the behaviour of frame and frame-shear wall systems carried out. For frames it is shown that owing to creep and shrinkage in concrete significant load transfer can take place from exterior columns to interior columns or otherwise and the nature of such load transfer changes along the height similar behaviour is observed for frame shear-wall systems.

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