

Cairo University
Faculty of Engineering
Structural Engineering Department

***EFFECT OF STIFFNESS AND MASS VARIATIONS
ON THE SEISMIC RESPONSE OF REINFORCED
CONCRETE FRAMES***

A Thesis

Submitted in Partial Fulfillment of the Requirements for
the Degree of
Master of Science in Civil Engineering (Structural)

By

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B.Sc. in Civil Engineering
Ain shams University, May 1995

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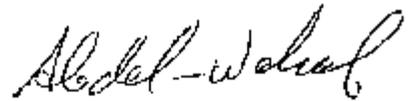
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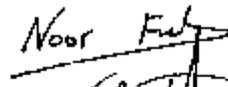
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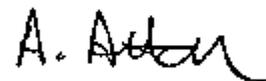
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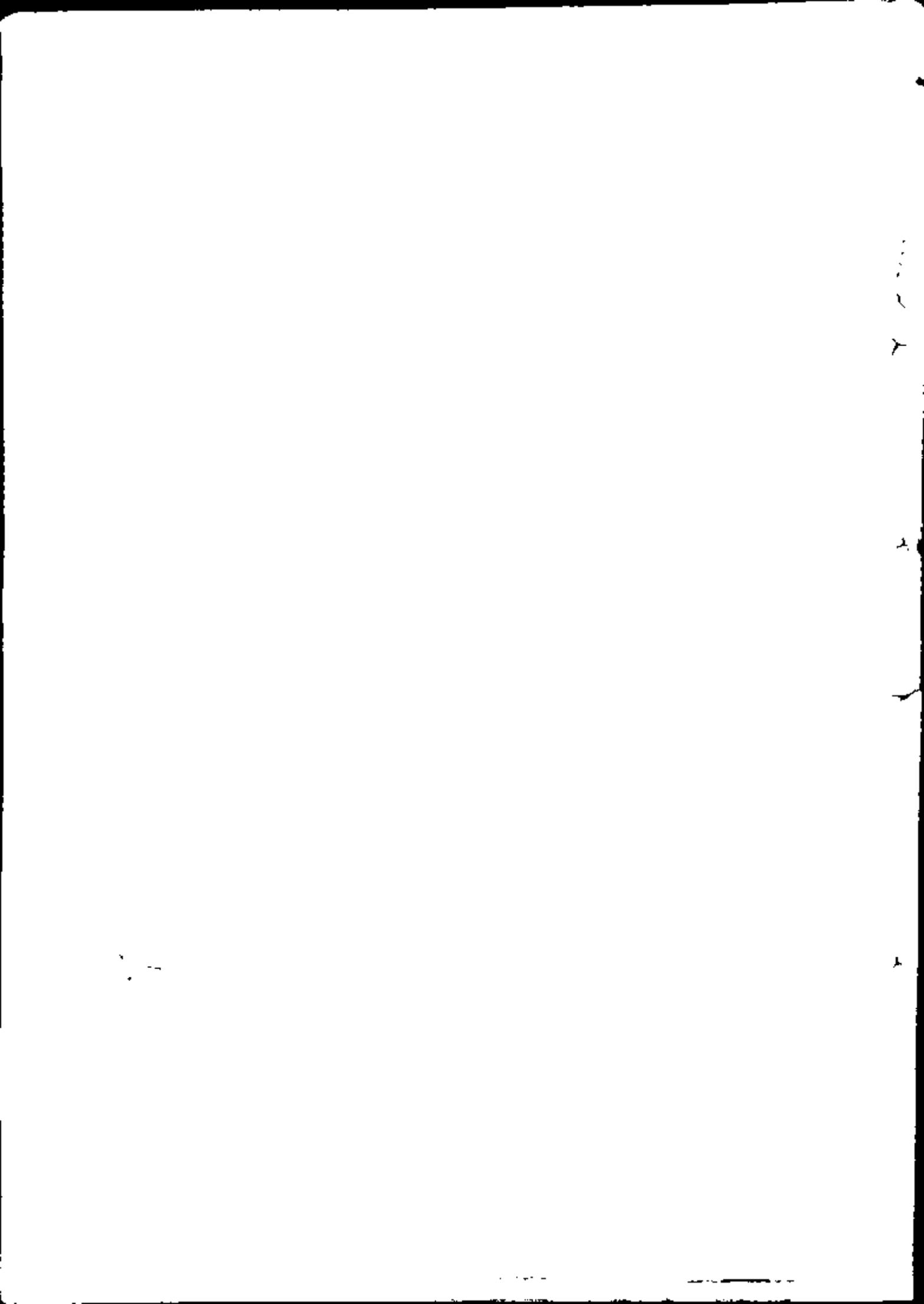


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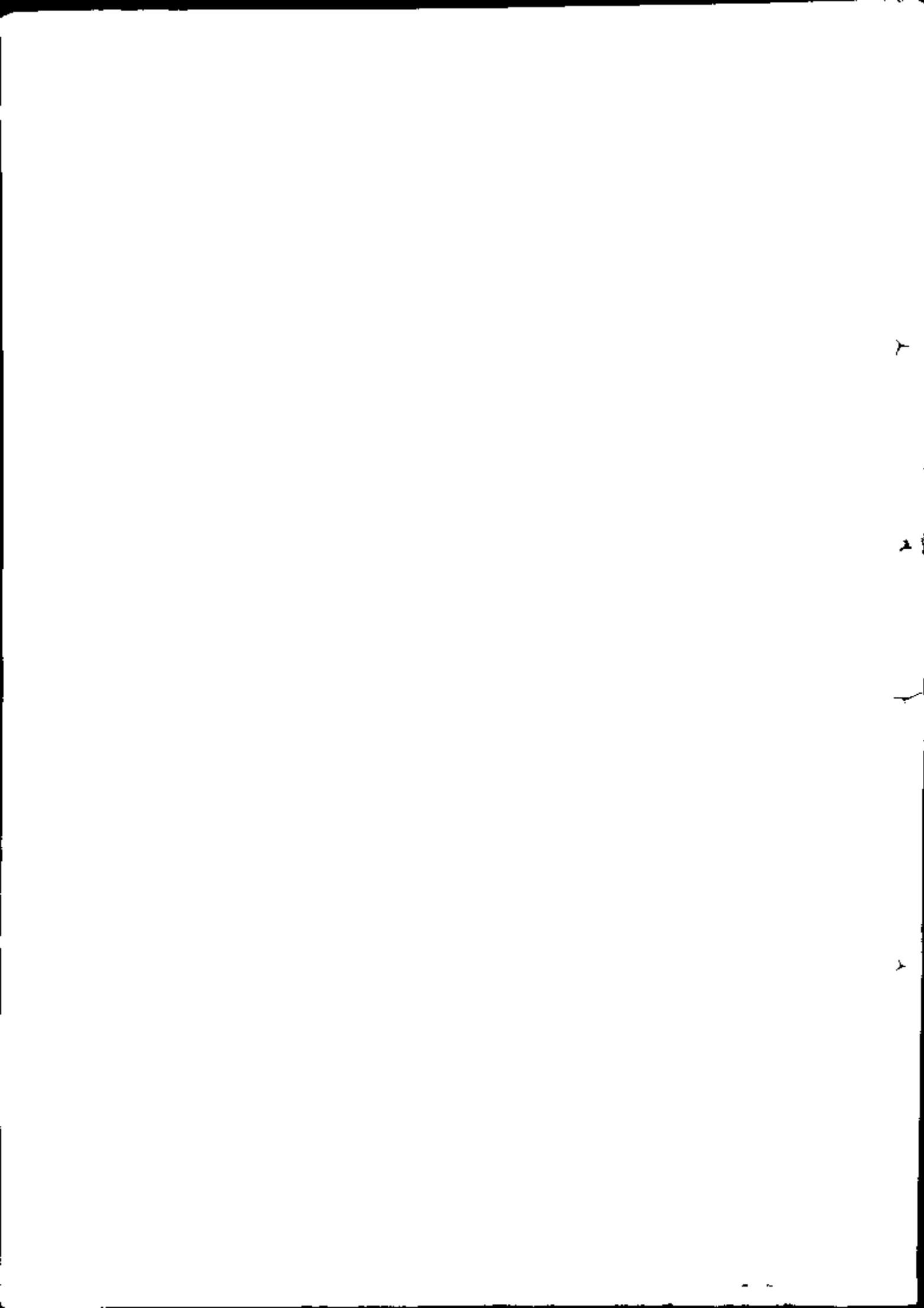


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بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ



ABSTRACT

Seismic code provisions restrict the use of equivalent static method for estimating earthquake loads to regular buildings, and provide a limiting value for variations in stiffness and mass beyond which dynamic analysis is required. In this research, the effect of stiffness and mass variations on frame-type reinforced concrete buildings is investigated using a non-linear dynamic analysis program IDARC 4.0 and using the equivalent static method as well as linear. The structures studied were two-dimensional building frames with 5, 7, and 10 stories. The parametric study included 6 groups of frames, each group consisted of three frames. The first three groups were used to investigate irregularities in stiffness and the second three groups were used to investigate irregularities in mass. The variation in stiffness resulted from transferring one column or two columns at the first floor. The variation in mass considered an increase in mass at specific stories due to variations in function/use. Each group was analyzed using five different earthquake records. The earthquakes used were three artificial records based on a design spectrum, as well as records from the November 22, 1995 Aqaba earthquake and the August 17, 1999 Izmit, Turkey earthquake. The records were scaled for a peak ground acceleration of 0.12 g. seismic response was computed using both the equivalent static method and dynamic, nonlinear time-history analysis. Response parameters included story shear, drift, damage index and failure modes. Results of the dynamic analysis using the five different records are examined and compared to those obtained using the equivalent static force method.

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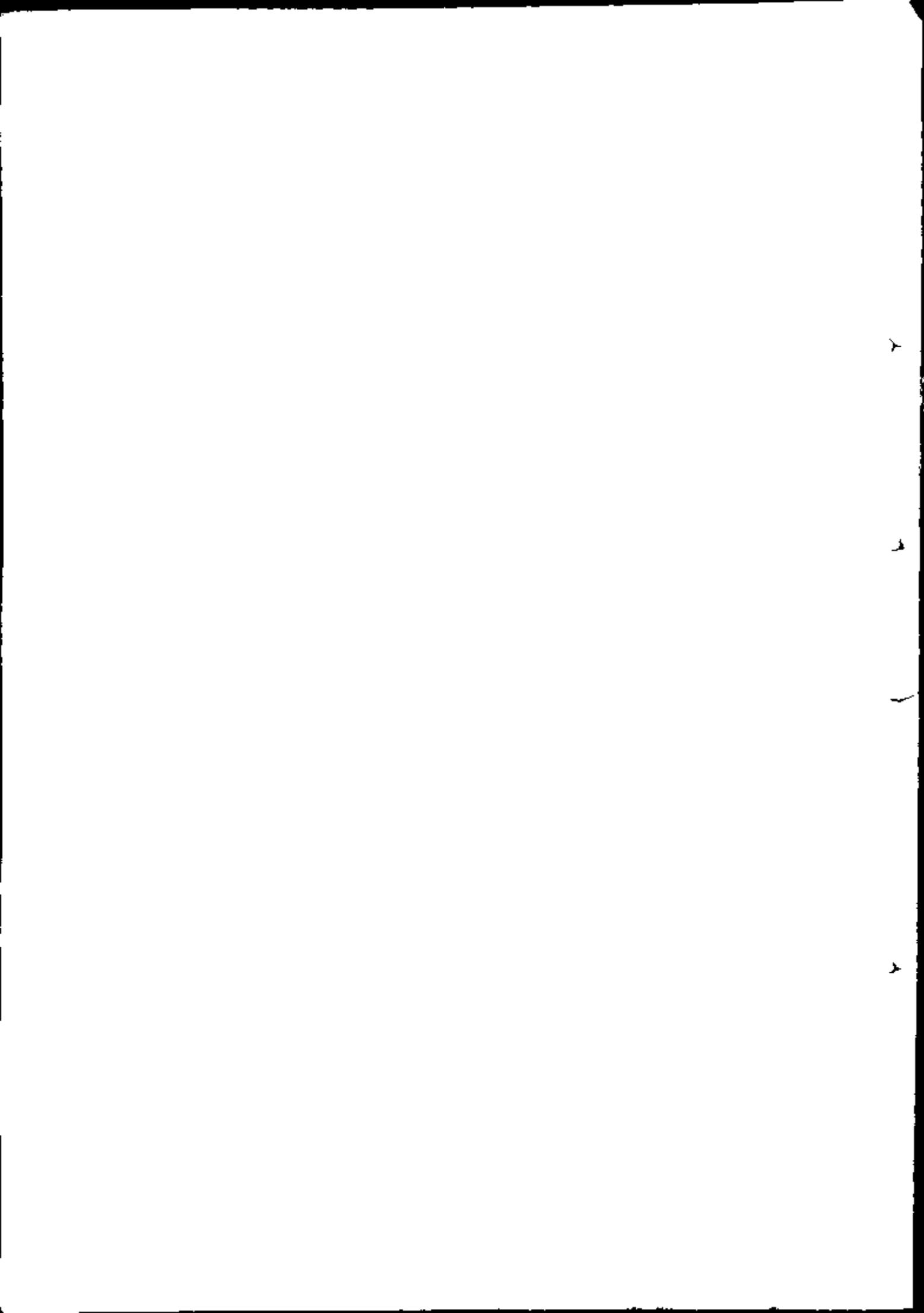
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M. N. M. M



*To My Parents And
To My Sister*

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