P R E F A C E

This thesis which contains five chapters is concerned with some linear and non-linear problems of thin elastic plates.

The first chapter contains two linear problems on uniformly compressed thin plates of variable thickness. Basic simplifying assumptions for the development of the theory remain the same as in the case of a plate of uniform thickness. In the first paper of this chapter the symmetrical bending of an annular plate whose thickness varies inversly as the distance from the centre has been investigated. The same problem was solved by Basuli (1961) with linearly varying thickness. At the outer boundary both the deflection and slope are zero while at the inner boundary only the slope vanishes. It is assumed that the normal load is either distributed uniformly round the hole with the remaining part of the surface free or that the load is distributed uniformly over the plate surface. In the absence of any force in the middle plane of the plate, the symmetrical bending of circular plates of variable thickness was first discussed by Holzer (1918). Since then, many authors have investigated the problem, the outstanding investigation amongst them being those of Pitchler (1928) and Olsson (1937). The last named author (1939) has also solved the problem of unsymmetrical bending of circular plates. The second paper of this chapter is deveted to the bending of

involving Bessel's function which is convergent. In the second paper of this chapter the large deflection of a circular plate subjected to a concentrated load at a distance from the centre has been investigated. The corresponding result (Basuli, 1961) for the problem with the load at the centre has also been deduced. The third paper of this chapter deals with the large deflection of an orthotropic circular plate under a concentrated load at the centre. The corresponding problem on the application of this technique of Berger to the case of orthotropic plates under uniform load was given by Iwinski and Nowinski (1957). The fourth paper of this chapter is concerned with the large deflection of a semi-circular plate, simply-supported along the boundary. The deflection is obtained in terms of Bessel functions and Lommel functions. The fifth paper of this chapter is devoted to the large deflection of an elliptic plate with clamped edges. The deflection is obtained in terms of Mathieu functions. The sixth paper of this chapter deals with the large deflection of an isoceles right-angled triangular plate under uniform load. The deflection of an orthotropic plate has been investigated first. Then the deflection in the case of isotropic plate has also been deduced.

The third chapter contains two non-linear plate problems of variable thickness based on the approximate

method of Berger (1955). The first paper of this chapter consists of the large deflection of a square plate whose thickness varies uni-directionally as the cube root of the distance of the parallel strip from the origin and an infinite strip plate whose thickness varies along the breadth. The second paper of this chapter deals with the large deflection of a circular plate with thickness varying as the cube root of the distance from the centre. The corresponding problem with linearly varying thickness is due to Basuli (1961).

The fourth chapter consists of only one problem on time-hardening and time-softening elastic plates. The free vibrations of different elastic plates have been considered, Young's modulus being assumed to be a function of time of the asymptotic type. The deflections of rectangular and triangular plates of such materials are obtained in terms of Bessel's functions of purely imaginary orders.

The fifth and the last chapter consists of only one problem on large amplitude free vibrations of different elastic plates. Applying the technique offered by Berger (1955), Nash and Modeer (1960) investigated the large amplitude free vibrations of rectangular and circular plates. In this paper the large amplitude free vibrations of triangular, elliptic and semi-circular plates have been considered on applying the same technique offered by Berger.