2.081J/16.230J Plates and Shells

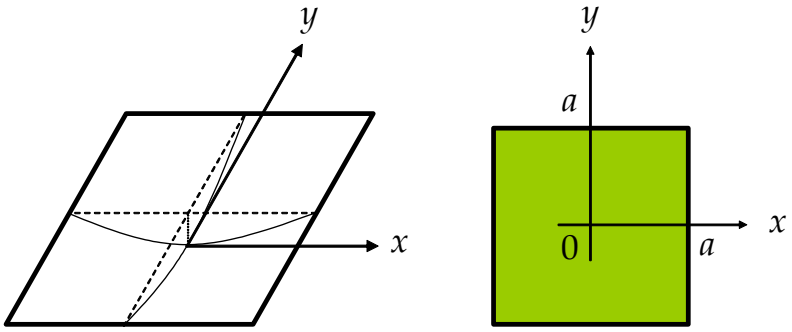
Homework #1
Due date: Class on Tuesday February 21

***PROBLEM* 1**

Consider a square plate subjected to a certain type of loading. Under this loading, the plate assumes a shape of a paraboloid:

$$w = -\frac{M}{2D\,(1+\nu)}\left(x^2+y^2\right)$$

where M is the applied edge moment, D is the bending rigidity of the plate, and ν is the Poisson ratio.



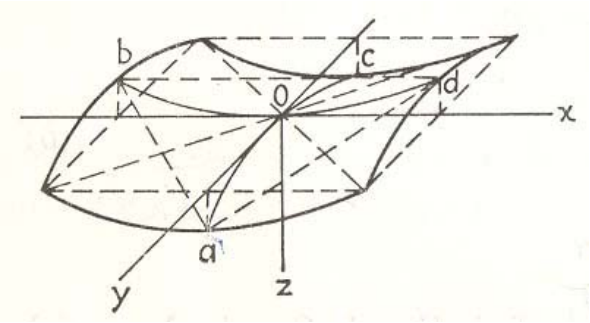
Determine:

1. **(a)** components of the curvature tensor, $\kappa_{\alpha\beta}$
   (b) components of the bending moment tensor, $M_{\alpha\beta}$
   (c) shear force vector, Q_α
   (d) bending moments and shear forces on all four edges
   (e) corner forces

PROBLEM 2

Consider the "anticlastic" deflection profile of the plate given by:

$$w = -\frac{M}{2D\,(1-\nu)}\left(x^2 - y^2\right)$$



Answer the questions (a) through (e) of the Problem 1.

PROBLEM 3

Derive equations of equilibrium of the plate from the free body diagram, shown below: