**LECTURE ASSIGNMENT 2**

Consider vibration of a rectangular membrane of side length , density , thickness , and tightening  (force per unit length). If the edges are fixed, find the angular velocity of the free vibrations using the Finite Difference Method on a regular grid of points . Consider the mode, which is reflection symmetric with respect to the lines through the center point (figure).

*x*

*L*

*y*

*L*

Name**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** Student number**\_\_\_\_\_\_\_\_\_\_\_\_\_**

In a time-dependent membrane problem, the equations given by the Finite Difference Method on regular grid of spacing  are

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Initial conditions are not needed in modal analysis of the problem. In the present problem, the set of interior points is given by



the remaining of  being boundary points of vanishing displacements. Due to the reflection symmetry, displacements at the interior points are equal,  say. Consequently, all equations for the interior points  boil down to

 where .

Therefore, the frequency of the assumed mode shape

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