Computational Structural Mechanics and Dynamics

Assignment 9 – Nicolas Andre Caronte Grønland

Tasks:

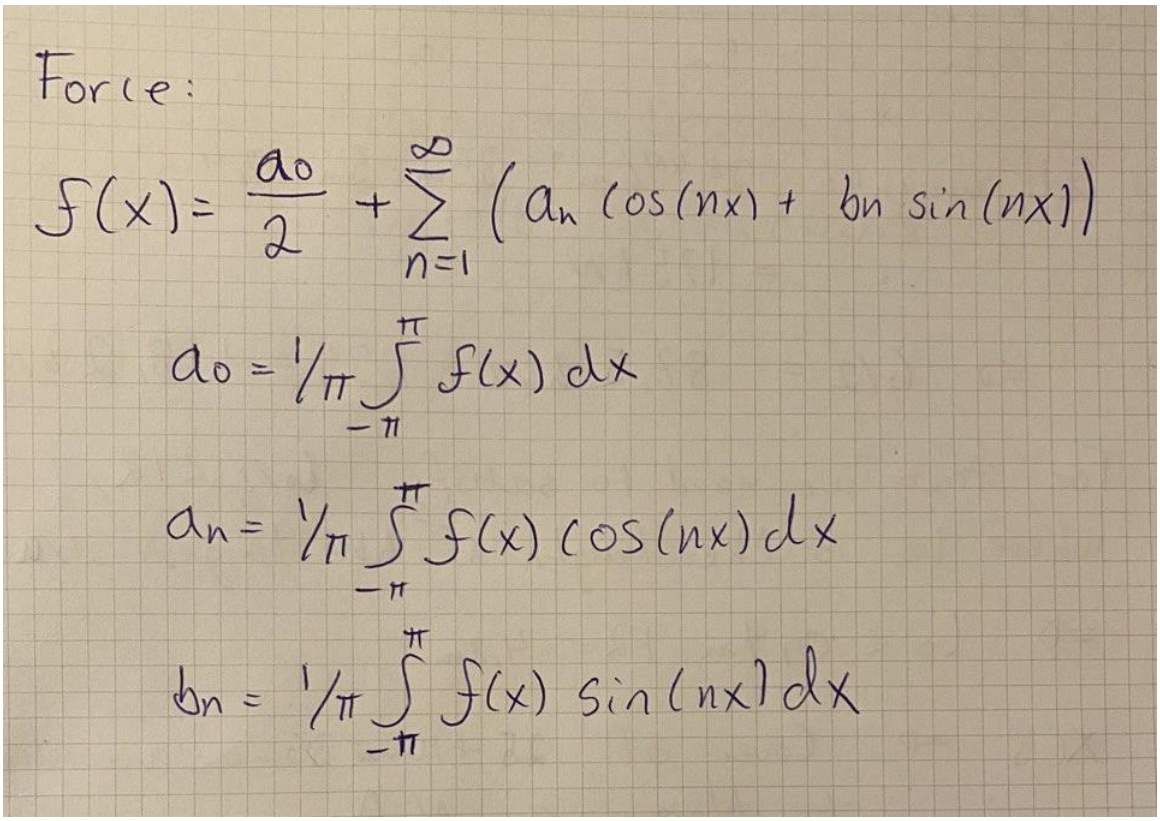
a) Describe in extension how can be applied a non symmetric load on this formulation.

b) Using thin beams formulation, describe the shape of the B(e) matrix and comment the integration rule.

Problem a)

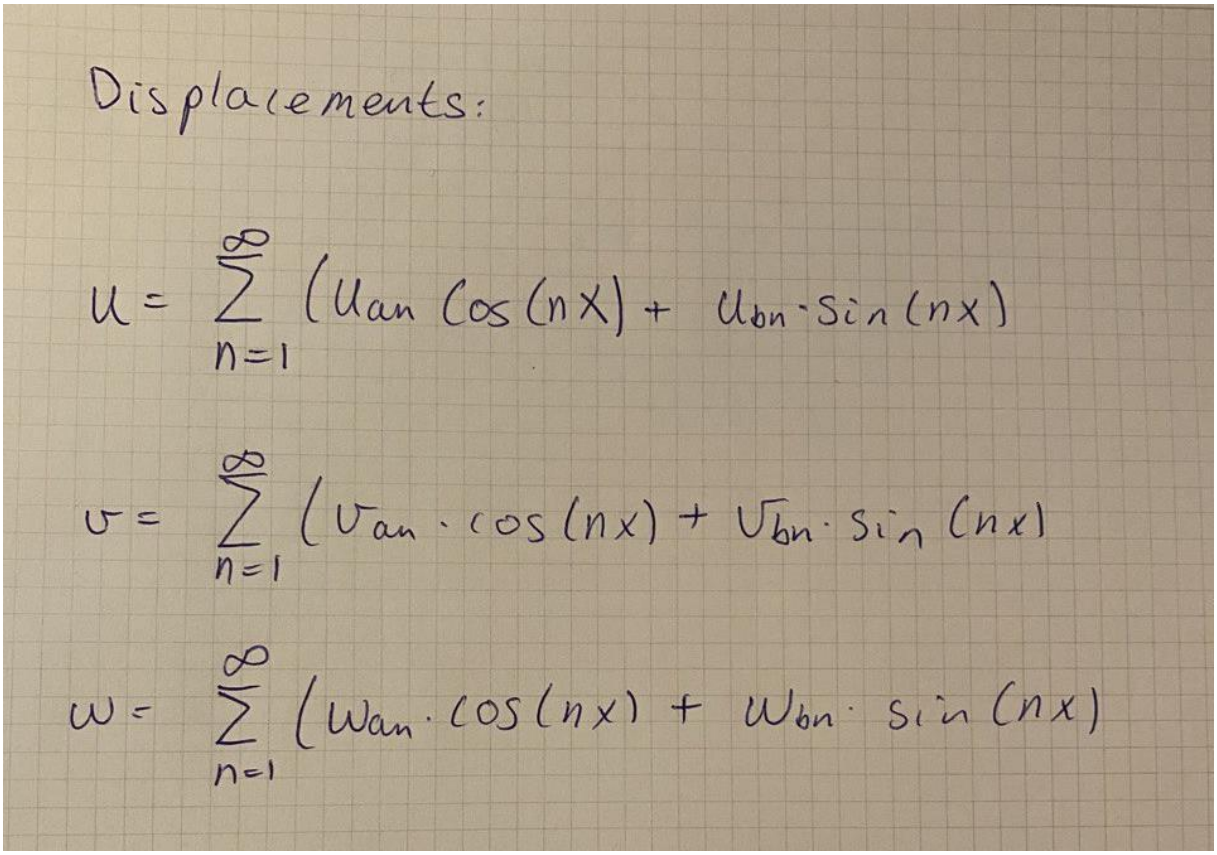
We are now considering an axisymmetrical shell with non symmetric loading. For a non-axisymmetric load we have to reconsider the right hand side of the system of equations. To do this one has to express the displacements and force components through Fourier-series, and after that one can solve the problem numerically.

Expressing the force components, right hand side:



Note that x represents the circumferential direction.

Expressing the displacements:



u, v and w are the axial, radial and circumferential displacements respectively.

Problem b)

The shear effects arise, but are neglected for thin beam formulation. This means that the B(e) matrix will consist of the bending part ,B_b, and the membrane part, B_m. For the membrane part, membrane locking will arise for fully integrated elements, thus giving a stiffer solution. As for handling shear locking one can handle membrane locking by reduced integration of the membrane part of the K-matrx.