

4.6 Exercises

4-3 Two-dimensional element of rectangle with four nodes.

(1) Using the equations of shape functions, verify the following:

$$N_a(\xi_b, \eta_b) = \delta_{ab} = \begin{cases} 1, & a = b \\ 0, & a \neq b \end{cases} \quad \sum_{a=1}^4 N_a(\xi, \eta) = 1$$

(2) Using the equations of shape functions, compute the following derivatives:

$$\frac{\partial N_a}{\partial \xi}, \frac{\partial N_a}{\partial \eta}, \frac{\partial^2 N_a}{\partial \xi \eta}, \frac{\partial^2 N_a}{\partial \xi^2}, \frac{\partial^2 N_a}{\partial \eta^2}, \quad a = 1, 2, 3, 4$$