**Project: Dispersion of fifth order stokes waves**

Stokes wave theory is particularly useful in the design of offshore structures as it helps in determining the wave loads on a structure. In order to estimate the design loads for an offshore structure, two parameters – wavelength (L) and the amplitude parameter (a) of gravity waves are needed. These two parameters are obtained by solving two coupled nonlinear fifth order stokes equations.

Where

The attached manuscript provides a numerical method to solve this set of stokes equations iteratively. Develop an R code and solve the system of equations to determine L and a.

Given: water depth (d) = 9 m, Wave period (T) = 7 sec, Crest to trough height (H) = 5.67 m.

Initial Guesses (L0,a0) = (60, 2.5)