74. Modified Galerkin Method for the Wiener-Hopf Integral Equation for a Semi-Inverted Cassini

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In determining the location of wreckage pieces like that of an airplane crash, smaller parts of the wreckage, such as wheels, may be more likely to remain intact. Solutions of the Wiener-Hopf Integral Equation via scattering theory can be used to determine the location of underwater spherical objects. Analytical solutions for deep-water spherical objects like airplane wheels do not exist. When the Kernel of the integral equation is weakly singular, accurate numerical integration techniques such as Gauss-Legendre Quadrature are insufficient. This research project finds a numerical solution to the half-line Wiener-Hopf equation by applying the Modified Galerkin Method to a spherical semi-inverted cassini. This method modifies a weakly singular kernel, given by $\frac{1}{\gamma\sqrt{2\pi}} \exp \frac{-(t-s)^2}{2\gamma^2}$ by adding an infinite series of radiating waves. The project applies the Dirichlet Boundary condition where the incident incoming electromagnetic wave is given by $E\,(t) = E_0\,\sqrt{e^{-\alpha t}}\,\sin\frac{\omega t}{c}$