Null-field integral equation approach for boundary value problems with circular boundaries

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Abstract

In this talk, a systematic approach is proposed to deal with boundary value problems containing circular boundaries. Null-field integral equations are employed to solve the problem. The mathematical tools, degenerate kernels and Fourier series, are utilized. The kernel function is expanded to degenerate form and the boundary density is expressed in terms of Fourier series. By moving the null-field point to the boundary, the singularity novelly disappears. By matching the boundary condition, a linear algebraic system is obtained. After obtaining the unknown Fourier coefficients, the solution can be obtained by using the integral representation. This systematic approach can be applied to the Laplace, Helmhotz and biharmonic problems. Finally, several examples are demonstrated to check the validity of present formulation.

References

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