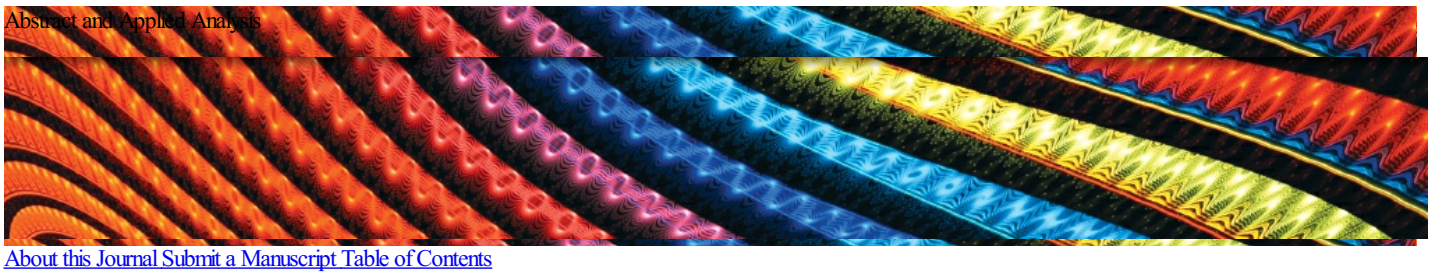

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Research Article

Null Field and Interior Field Methods for Laplace's Equation in Actually Punctured Disks

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Linked References

1. M. R. Barone and D. A. Caulk, "Special boundary integral equations for approximate solution of Laplace's equation in two-dimensional regions with circular holes," *The Quarterly Journal of Mechanics and Applied Mathematics*, vol. 34, no. 3, pp. 265–286, 1981. View at Publisher · View at Google Scholar · View at MathSciNet
2. M. R. Barone and D. A. Caulk, "Special boundary integral equations for approximate solution of potential problems in three-dimensional regions with slender cavities of circular cross-section," *IMA Journal of Applied Mathematics*, vol. 35, no. 3, pp. 311–325, 1985. View at Publisher · View at Google Scholar · View at MathSciNet
3. D. A. Caulk, "Analysis of steady heat conduction in regions with circular holes by a special boundary-integral method," *IMA Journal of Applied Mathematics*, vol. 30, pp. 231–246, 1983. View at Google Scholar
4. M. D. Bird and C. R. Steele, "A solution procedure for Laplace's equation on multiply connected circular domains," *Journal of Applied Mechanics*, vol. 59, pp. 398–3404, 1992. View at Google Scholar
5. Z. C. Li, *Combined Methods for Elliptic Equations with Singularities, Interfaces and Infinities*, Kluwer Academic Publishers, Boston, Mass, USA, 1998. View at Publisher · View at Google Scholar · View at MathSciNet
6. Z.-C. Li, T.-T. Lu, H.-Y. Hu, and A. H.-D. Cheng, *Trefftz and Collocation Methods*, WIT Press, Boston, Mass, USA, 2008. View at MathSciNet
7. W. T. Ang and I. Kang, "A complex variable boundary element method for elliptic partial differential equations in a multiple-connected region," *International Journal of Computer Mathematics*, vol. 75, no. 4, pp. 515–525, 2000. View at Publisher · View at Google Scholar · View at MathSciNet
8. J. T. Chen, S. R. Kuo, and J. H. Lin, "Analytical study and numerical experiments for degenerate scale problems in the boundary element method for two-dimensional elasticity," *International Journal for Numerical Methods in Engineering*, vol. 54, no. 12, pp. 1669–1681, 2002. View at Google Scholar
9. J. T. Chen, C. F. Lee, J. L. Chen, and J. H. Lin, "An alternative method for degenerate scale problem in boundary element methods for two-dimensional Laplace equation," *Engineering Analysis with Boundary Elements*, vol. 26, pp. 559–569, 2002. View at Google Scholar
10. J.-T. Chen and W.-C. Shen, "Degenerate scale for multiply connected Laplace problems," *Mechanics Research Communications*, vol. 34, no. 1, pp. 69–77, 2007. View at Publisher · View at Google Scholar · View at MathSciNet
11. J.-T. Chen and W.-C. Shen, "Null-field approach for Laplace problems with circular boundaries using degenerate kernels," *Numerical Methods for Partial Differential Equations*, vol. 25, no. 1, pp. 63–86, 2009. View at Publisher · View at Google Scholar · View at MathSciNet
12. J. T. Chen, H. C. Shieh, Y. T. Lee, and J. W. Lee, "Bipolar coordinates, image method and the method of fundamental solutions for Green's functions of Laplace problems containing circular boundaries," *Engineering Analysis with Boundary Elements*, vol. 35, no. 2, pp. 236–243, 2011. View at Publisher · View at Google Scholar · View at MathSciNet
13. J. T. Chen, C. S. Wu, and K. H. Chen, "A study of free terms for plate problems in the dual boundary integral equations," *Engineering Analysis with Boundary Elements*, vol. 29, pp. 435–446, 2005. View at Google Scholar
14. S. R. Kuo, J. T. Chen, and S. K. Kao, "Linkage between the unit logarithmic capacity in the theory of complex variables and the degenerate scale in the BEM/BIEMs," *Applied Mathematics Letters*, vol. 29, pp. 929–938, 2013. View at Google Scholar
15. M.-G. Lee, Z.-C. Li, H.-T. Huang, and J. Y. Chiang, "Conservative schemes and degenerate scale problems in the null-field method for Dirichlet problems of Laplace's equation in circular domains with circular holes," *Engineering Analysis with Boundary Elements*, vol. 37, no. 1, pp. 95–106, 2013. View at Publisher · View at Google Scholar · View at MathSciNet
16. M.-G. Lee, Z.-C. Li, L. P. Zhang, H.-T. Huang, and J. Y. Chiang, "Algorithm singularity of the null-field method for Dirichlet problems of Laplace's equation in annular and circular domains," submitted to. *Engineering Analysis with Boundary Elements*.
17. Z.-C. Li, H.-T. Huang, C.-P. Liaw, and M.-G. Lee, "The null-field method of Dirichlet problems of Laplace's equation on circular domains with circular holes," *Engineering Analysis with Boundary Elements*, vol. 36, no. 3, pp. 477–491, 2012. View at Publisher · View at Google Scholar · View at MathSciNet
18. V. D. Kupradze and M. A. Aleksidze, "The method of functional equations for the approximate solution of certain boundary-value problems," *USSR Computational Mathematics and Mathematical Physics*, vol. 4, pp. 82–126, 1964. View at Google Scholar · View at MathSciNet
19. G. Fairweather and A. Karageorghis, "The method of fundamental solutions for elliptic boundary value problems," *Advances in Computational Mathematics*, vol. 9, no. 1-2, pp. 69–95, 1998. View at Publisher · View at Google Scholar · View at MathSciNet
20. C. S. Chen, Y. C. Hon, and R. A. Schaback, *Scientific computing with radial basis functions [Ph.D. thesis]*, Department of Mathematics, University of Southern Mississippi, Hattiesburg, Miss, USA, 2005.
21. Z.-C. Li, H.-T. Huang, M.-G. Lee, and J. Y. Chiang, "Error analysis of the method of fundamental solutions for linear elastostatics," *Journal of Computational and Applied Mathematics*, vol. 251, pp. 133–153, 2013. View at Publisher · View at Google Scholar · View at MathSciNet
22. Z.-C. Li, J. Huang, and H.-T. Huang, "Stability analysis of method of fundamental solutions for mixed boundary value problems of Laplace's equation," *Computing*, vol. 88, no. 1-2, pp. 1–29, 2010. View at Publisher · View at Google Scholar · View at MathSciNet
23. T. Wriedt, "Review of the null-field method with discrete source," *Journal of Quantitative Spectroscopy and Radiative Transfer*, vol. 106, pp. 534–545, 2007. View at Google Scholar
24. A. Doicu and T. Wried, "Calculation of the T matrix in the null-field method with discret sources," *The Journal of the Optical Society of America*, vol. 16, pp. 2539–2544, 1999. View at Google Scholar
25. J. Hellmers, V. Schmidt, and T. Wriedt, "Improving the numerical instability of T-matrix light scattering calculations for extreme articles shapes using the nullfield method with discrete sources," *Journal of Quantitative Spectroscopy and Radiative Transfer*, vol. 112, pp. 1679–1686, 2011. View at Google Scholar
26. D. Palaniappan, "Electrostatics of two intersecting conducting cylinders," *Mathematical and Computer Modelling*, vol. 36, no. 7-8, pp. 821–830, 2002. View at Publisher · View at Google Scholar · View at MathSciNet
27. M. Abramowitz and I. A. Stegun, *Handbook of Mathematical Functions with Formulas, Graphs and Mathematical Tables*, Dover Publications, New York, NY, USA, 1964.
28. K. E. Atkinson, *A Survey of Numerical Methods for the Solutions of Fredholm Integral Equations of the Second Kind*, Cambridge University Press, 1997.
29. G. C. Hsiao and W. L. Wendland, *Boundary Integral Equations*, Springer, Berlin, Germany, 2008. View at Publisher · View at Google Scholar · View at MathSciNet
30. C. B. Liem, T. Lü, and T. M. Shih, *The Splitting Extrapolation Method*, World Scientific, Singapore, 1995. View at MathSciNet

31. H.-O. Kreiss and J. Oliger, "Stability of the Fourier method," *SIAM Journal on Numerical Analysis*, vol. 16, no. 3, pp. 421–433, 1979. View at Publisher · View at Google Scholar · View at MathSciNet
32. J. E. Pasciak, "Spectral and pseudospectral methods for advection equations," *Mathematics of Computation*, vol. 35, no. 152, pp. 1081–1092, 1980. View at Publisher · View at Google Scholar · View at MathSciNet
33. C. Canuto and A. Quarteroni, "Approximation results for orthogonal polynomials in Sobolev spaces," *Mathematics of Computation*, vol. 38, no. 157, pp. 67–86, 1982. View at Publisher · View at Google Scholar · View at MathSciNet
34. C. Canuto, M. Y. Hussaini, A. Quarteroni, and T. A. Zang, *Spectral Methods, Fundamentals in Single Domains*, Springer, New York, NY, USA, 2006. View at MathSciNet
35. Z.-C. Li, H.-T. Huang, Y. Wei, and A. H.-D. Cheng, *Effective Condition Number for Numerical Partial Differential Equations*, Science Press, Beijing, China, 2013.