

Babich, V. M.; Grigor'eva, N. S.

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References:

- [1] V. M. Babich and N. S. Grigor'eva, ?A three-dimensional analogue of the Watson method; nonspectral singularities of Green's function and the asymptotic behavior of nonstationary problem as $t \rightarrow \infty$? in: Theory of Diffraction and Wave Propagation, Sixth All-Union Symposium on Diffraction and Wave Propagation, Vol. 2, Erevan (1973), pp. 64?68.
- [2] V. M. Babich and N. S. Grigor'eva, ?On the analytic continuation to the second sheet of the resolvent of exterior three-dimensional problems for the Laplace operator,? Funkts. Anal. Ego Prilozhen.8, No. 1, 71?72 (1974). · [Zbl 0349.46034](#) · [doi:10.1007/BF02028314](#)
- [3] B. R. Vainberg, ?The behavior of the solution of the Cauchy problem for a hyperbolic equation as $t \rightarrow \infty$,? Mat. Sb.,78(120), No. 4, 542?578 (1969).
- [4] V. G. Maz'ya and A. A. Plamenevskii, ?On the asymptotic behavior of solutions of differential equations in Hubert space,? Izv. Akad. Nauk SSSR, Ser. Mat.,36, No. 5, 1080?1133 (1972).
- [5] P. Lax and R. Phillips, Scattering Theory, Academic Press, New York (1967).
- [6] D. M. Eidus, ?On the limiting absorption principle,? Dokl. Akad. Nauk SSSR,125, No. 3, 508?511 (1959).
- [7] D. M. Eidus, ?On the limiting absorption principle,? Mat. Sb.,57 (99), No. 1, 13?44 (1962).
- [8] N. D. Kazarinoff and R. K. Ritt, ?Scalar diffraction theory and turning-point problems,? Arch. Rat. Mech. Anal.,5, No. 2, 177?186 (1960). · [Zbl 0101.21505](#) · [doi:10.1007/BF00252901](#)
- [9] L. A. Muravei, ?Decay of solutions of the second exterior boundary value problem for the wave equation with two spatial variables,? Dokl. Akad. Nauk SSSR,193, No. 5, 996?999 (1970).
- [10] V. M. Babich, ?On me asymptotic behavior of the Green functions of some wave problems,? Dokl. Akad. Nauk SSSR,199, No. 4, 743?746 (1971).
- [11] V. P. Mikhailov, ?On the limiting amplitude principle,? Dokl. Akad. Nauk SSSR,159, No. 4, 750?752 (1964).
- [12] T. I. Zelenyak and V. P. Mikhailov, ?The asymptotic behavior of solutions of some boundary value problems of mathematical physics as $t \rightarrow \infty$,? in: Partial Differential Equations [in Russian], Nauka, Moscow (1970), pp. 96?118.
- [13] V. M. Babich, ?On the asymptotic behavior of the Green functions of some wave problems. I,? Mat. Sb.,86 (128), 518?537 (1971).
- [14] V. M. Babich, ?On the asymptotic behavior of the Green functions of some wave problems. II,? Mat. Sb.,87 (129), 44?57 (1972).
- [15] I. M. Gelfand and G. E. Shilov, Generalized Functions. Properties and Operations, Academic Press (1964).
- [16] C. S. Morawetz and D. Ludwig, ?The generalized Huyghen's principle for reflecting bodies,? Commun. Pure Appl. Math.,22, 189?205 (1969). · [Zbl 0167.10102](#) · [doi:10.1002/cpa.3160220204](#)
- [17] R. S. Phillips, ?A remark on the preceding paper of C. S. Morawetz and D. Ludwig, ? Commun. Pure Appl. Math.,22, 207?211 (1969). · [Zbl 0167.10103](#) · [doi:10.1002/cpa.3160220205](#)
- [18] P. D. Lax and R. S. Phillips, ?Scattering theory,? Bull. Am. Math. Soc.,70, 130?142 (1964). · [Zbl 0117.09104](#) · [doi:10.1090/S0002-9904-1964-11051-X](#)
- [19] P. D. Lax and R. S. Phillips, ?The wave equation in exterior domains,? Bull. Am. Math. Soc.,68, 47?49 (1962). · [Zbl 0103.06401](#) · [doi:10.1090/S0002-9904-1962-10697-1](#)

- [20] B. R. Vainberg, ?On operator eigenfunctions corresponding to the poles of the analytic continuation of the resolvent across the continuous spectrum,? *Mat. Sb.*,87 (129), 293?308 (1972). · [Zbl 0252.35050](#)
- [21] B. R. Vainberg, ?On the analytic properties of the resolvent for a class of operator pencils,? *Mat. Sb.*,77 (119), 259?296 (1968).
- [22] A. F. Filippov, ?Justification of the short-wave asymptotics in the three-dimensional diffraction problem,? *Sib. Mat. Zh.*,10, No. 6, 1406?1421 (1969). · [Zbl 0183.11004](#) · [doi:10.1007/BF01208419](#)
- [23] F. Ursell, ?On the short-wave asymptotic theory of the wave equation $(\Delta + k^2)u = 0$,? *Proc. Camb. Phil. Soc.*,53, No. 1, 115?133 (1957). · [doi:10.1017/S0305004100032060](#)
- [24] V. M. Babich, ?On the short-wave asymptotics of Green's function for the Helmholtz equation,? *Mat. Sb.*,65 (107), No. 4, 576?630 (1964).
- [25] V. D. Andronov, ?Some applications of Ursell's method in short-wave problems for the Helmholtz equation,? Dissertation, Leningrad State Univ. (1965).
- [26] F. Ursell, ?On the rigorous foundation of short-wave asymptotics,? *Proc. Camb. Phil. Soc.*,62, No. 2, 227?244 (1966). · [Zbl 0142.45503](#) · [doi:10.1017/S0305004100039797](#)
- [27] N. S. Grigor'eva, ?Ursell's approach for obtaining a priori estimates of the solution of the Neumann problem for the Helmholtz equation,? *Zap. Nauchn. Sem. Leningr. Otd. Mat. Inst.*,42, 85?155 (1974).
- [28] C. S. Morawetz and D. Ludwig, ?An inequality for the reduced wave operator and the justification of geometrical optics,? *Commun. Pure Appl. Math.*,21, No. 2, 187?203 (1968). · [Zbl 0157.18701](#) · [doi:10.1002/cpa.3160210206](#)
- [29] V. M. Babich, ?The procedure of D. Ludwig and of the boundary layer in the problem of diffraction by a smooth body,? *Zap. Nauchn. Sem. Leningr. Otd. Mat. Inst.*,27, 17?33 (1972).
- [30] V. M. Babich, ?On the rigorous justification of the short-wave approximation in the three-dimensional case,? *Zap. Nauchn. Sem. Leningr. Otd. Mat. Inst.*,34, 23?51 (1973).
- [31] V. S. Buslaev, ?Potential theory and geometrical optics,? *Zap. Nauchn. Sem. Leningr. Otd. Mat. Inst.*,22, 175?180 (1971). · [Zbl 0284.35017](#)
- [32] I. M. Gelfand and G. E. Shilov, *Functions and Generalized Function Spaces*, Academic Press (1968).
- [33] L. Schwartz, *Théorie des Distributions*, Paris (1951).
- [34] N. M. Gunter, *Potential Theory and Its Applications of Mathematical Physics*, Ungar (1967).
- [35] O. A. Ladyzhenskaya, *The Mixed Problem for Hyperbolic Equations* [in Russian], Moscow (1953).
- [36] V. M. Babich and N. S. Grigor'eva, ?Free short-wave diffraction from an oblate spheroid,? *Zap. Nauchn. Sem. Leningr. Otd. Mat. Inst.*,42, 12?59 (1974).
- [37] V. M. Babich and N. S. Grigor'eva, ?Uniform asymptotic expansions of functions related to an oblate spheroid,? *Zap. Nauchn. Sem. Leningr. Otd. Mat. Inst.*,34, 6?23 (1973).
- [38] F. G. Leppington, ?Creeping waves in the shadow of an elliptic cylinder,? *J. Inst. Math. Appl.*,3, No. 4, 388?402 (1967). · [Zbl 0153.56503](#) · [doi:10.1093/imamat/3.4.388](#)
- [39] B. D. Sleeman, ?On diffraction at short wavelengths by a prolate spheroid,? *J. Inst. Math. Appl.*,5, No. 4, 432?442 (1969). · [Zbl 0189.10203](#) · [doi:10.1093/imamat/5.4.432](#)
- [40] D. Ludwig, ?Uniform asymptotic expansion of the field scattered by a convex object at high frequencies,? *Commun. Pure Appl. Math.*,20, No. 1, 103?138 (1967). · [Zbl 0154.12802](#) · [doi:10.1002/cpa.3160200103](#)
- [41] M. V. Fedoryuk, ?The method of stationary phase for multidimensional integrals,? *Zh. Vychisl. Mat. Mat. Fiz.*,2, No. 1, 145?150 (1962). · [Zbl 0122.12401](#)

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