

# Bibliography

- [1] Ahlfors, L., *Complex Analysis*, McGraw-Hill Book Co., New York, 1966.
- [2] Bak, J., Newman, D.J., *Complex Analysis*, Springer-Verlag, New York, 1997.
- [3] Carathéodory, C., *Theory of Functions of a Complex Variable*, Vol II, Chelsea Publishing Co., New York, 1954.
- [4] Conway, J., *Functions of One Complex Variable*, Vol. I,II, Springer-Verlag, New York, 1995.
- [5] Courant, R., Hilbert, D., *Methods of Mathematical Physics I, II*, Interscience Publishers, 1953, 1962.
- [6] Evgrafov, M.A., *Problem Book on Analytical Functions* (in Russian), Moscow, 1973.
- [7] Feyel, D., De la Pradelle, A., *Exercices sur les fonctions analytiques*, Arman Colin, Paris, 1973.
- [8] Fuchs, W.H.J., *Topics in the Theory of Functions of One Complex Variable*, D. Van Nostrand Co., 1967.
- [9] Hörmander, L., *The Analysis of Linear Partial Differential Operators I-IV*, Springer-Verlag, Berlin, 1983-1985.
- [10] John, F., *Partial Differential Equations*, Springer-Verlag, 1982.
- [11] Ladyzenskaya, O. A., Uraltseva N. N., *Linear and Quasilinear Elliptic Equations*, Academic Press, New York, 1968.
- [12] Lakshmikantham, V., Leela, S., *Differential and Integral Inequalities*, Academic Press, New York, 1969.
- [13] Lang, S., *Complex Analysis*, Springer-Verlag, New York, 1993.
- [14] Lelong, J., Ferrand, *Problèmes d'analyse C 1*, Paris, 1967.

- [15] Markushevich, A. I., *Theory of Functions of a Complex Variable*, Prentice-Hall, Englewood Cliffs, N.J., 1965.
- [16] Polya, G., Szegő, G., *Problems and Theorems in Analysis* (2 vols), Springer-Verlag (vol. I, 1972; vol. 2, 1976).
- [17] Pap, E., Takači, A., Takači, Dj., *Partial Differential Equations through Examples and Exercises*, Kluwer Academic Publishers, Dordrecht, 1997.
- [18] Rubinstein, Z., *A Course in Ordinary and Partial Differential Equations*, Academic Press, 1969.
- [19] Rudin, W., *Principles of Mathematical Analysis*, McGraw-Hill Book Co., New York, 1964.
- [20] Rudin, W., *Real and Complex Analysis*, McGraw-Hill Book Co., New York, 1966.
- [21] Schmeelk, J., Takači, Dj., Takači, A., *Elementary Analysis through Examples and Exercises*, Kluwer Academic Publishers, Dordrecht 1995.
- [22] Sobolev, S. L., *The Equations of the Mathematical Physics*, Nauka, Moscow, 1966 (in Russian).
- [23] Strang G., *Introduction to Applied Mathematics*, Wellesley-Cambridge Press, 1992.
- [24] Taylor M.E., *Partial Differential Equations I,II, III*, Springer-Verlag, 1996.
- [25] Titchmarsh, E.C., *The Theory of Functions*, Oxford University Press, London, 1939.
- [26] Tikhonov A., Samarski A. A., *Equations of Mathematical Physics*, Pergamon Press, New York, 1963.
- [27] Vvedensky, D., *Partial Differential Equations with Mathematica*, Addison-Wesley, 1993.
- [28] Vladimirov, V., S., *Equations of Mathematical Physics*, Nauka, Moscow, 1976.
- [29] Volkovskii, L.I., Lunts, G.L., Aramanovich, I.G., *Problem Book on Functions of a Complex Variable* (in Russian), Moscow, 1961.

# List of Symbols

$\mathbb{N}$	set of natural numbers
$\mathbb{Z}$	set of integers
$\mathbb{R}$	set of real numbers
$\mathbb{R}^n$	$n$ -dimensional real Euclidean space
$\mathbb{C}$	set of complex numbers
$i$	$\sqrt{-1}$ imaginary unit
$\bar{z}$	conjugate of the complex number $z$
$\operatorname{Re} z$	real part of a complex number $z$
$\operatorname{Im} z$	imaginary part of a complex number $z$
$ z $	absolute value of the complex number $z$
$\arg z$	argument of the complex number $z$
$A^c$	complement of the set $A$
$\chi_A$	characteristic function of the set $A$
$\cap$	intersection of sets
$\cup$	union of sets
$\setminus$	set difference
$\partial O$	border of the region $O$
$\bar{Q}$	closure of the region $Q$
$\liminf$	limit inferior
$\limsup$	limit superior
$\operatorname{Log} z$	multivalued complex logarithm
$\log z$	principal value of the complex logarithm
$\operatorname{Res}(f(z))_{z=z_0}$	residue of a function $f$ at $z_0$

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