

MEAN ERGODICITY OF MULTIPLICATION OPERATORS ON THE BLOCH AND BESOV SPACES

F. FALAHAT AND Z. KAMALI*

Abstract. In this paper, the power boundedness and mean ergodicity of multiplication operators are investigated on the Bloch space \mathcal{B} , the little Bloch space \mathcal{B}_0 and the Besov Space \mathcal{B}_p . We completely characterize power bounded, mean ergodic and uniformly mean ergodic multiplication operators on \mathcal{B} and \mathcal{B}_0 .

Mathematics subject classification (2020): 47B38, 46E15, 47A35.

Keywords and phrases: Multiplication operator, power bounded, mean ergodic operator, Bloch spaces, Besov spaces.

REFERENCES

- [1] A. A. ALBANESE, J. BONET, W. RICKER, *On mean ergodic operators in Fréchet spaces*, Ann. Acad. Sci. Fenn. Math., 34, 401–436 (2009).
- [2] A. A. ALBANESE, J. BONET, W. RICKER, *On mean ergodic operators*, *Vector Measures, Integration and Related Topics, Operator Theory, Advances and Applications*, 201, 1–20 (2010).
- [3] R. ALLEN, F. COLONNA, *Isometries and spectra of the multiplication operators on the Bloch space*, Bul. Aust. Math. Soc., 79, 147–160 (2009).
- [4] J. ANDERSON, J. CLUNIE AND CH. POMMERENKE, *On Bloch functions and normal functions*, J. Reine Angew. Math., 270, 12–37, (1974).
- [5] J. ARAZY, *Multipliers of Bloch Functions*, University of Haifa, Mathematical Publication Series, 54 (1982).
- [6] J. ARAZY, S. D. FISHER, J. PEETRE, *Möbius invariant function spaces*, J. Reine Angew. Math. 363, 110–145 (1985).
- [7] N. ARCOZZI, R. ROCHBERG, E. SAWYER, *Carleson measures for analytic Besov spaces*, Rev. Math. Iberoamericana 18 (2), 443–510 (2002).
- [8] S. AXLER, A. L. SHIELDS, *Univalent multipliers of the Dirichlet space*, Mich. Math. J. 32 (1), 65–80 (1985).
- [9] F. BAYART, E. MATHERON, *Dynamics of linear operators*, Cambridge Tracts in Mathematics, vol. 179, Cambridge University Press, Cambridge, 2009.
- [10] J. BONET, E. JORDÁ, A. RODRÍGUEZ, *Mean ergodic multiplication operators on weighted space of continuous functions*, Mediterranean J. Math. 15 (3), 1–11 (2018).
- [11] J. BONET, W. J. RICKER, *Mean ergodicity of multiplication operators in weighted spaces of holomorphic functions*, Arch. Math. 92, 428–437 (2009).
- [12] L. BROWN AND L. SHIELDS, *Multipliers and cyclic vectors in the Bloch space*, Michigan Math. J. 38, 141–146 (1991).
- [13] C. COWEN AND B. D. MACCLUER, *Composition operators on spaces of analytic functions*, CRC Press, Boca Raton, 1995.
- [14] J. J. DONAIRE, D. GIRELA, D. VUKOTÍC, *On univalent functions in some Möbius invariant spaces*, J. Reine Angew. Math. 553, 43–72 (2002).
- [15] N. DUNFORD, *Spectral theory I. Convergence to projections*, Trans. Amer. Math. Soc. 54, 185–217 (1943).
- [16] P. L. DUREN, B. W. ROMBERG AND A. L. SHIELDS, *Linear functions on H^p spaces with $0 < p < 1$* , J. Reine Angew. Math., 238, 32–60, (1969).

- [17] P. GALANOPoulos, D. GIRELA, J. MARTÍN, *Besov Spaces, Multipliers and Univalent Functions*, Complex Anal. Oper. Theory, 1081–1116 (2013).
- [18] E. JORDÁ AND A. RODRÍGUEZ-ARENAS, *Ergodic properties of composition operators on Banach spaces of analytic functions*, J. Math. Anal. Appl., 486 (2020).
- [19] U. KRENGEL, *Ergodic Theorems*, De Gruyter, Berlin, 1985.
- [20] M. LIN, *On the uniform ergodic theorem*, Proc. Amer. Math. Soc. 43, 337–340 (1974).
- [21] H. P. LOTZ, *Uniform convergence of operators on L^∞ and similar spaces*, Math. Z., 190, 207–220 (1985).
- [22] D. STEGENGA, *Multipliers of the Dirichlet space*, Illinois J. Math. 24 (1), 113–139 (1980).
- [23] Z. WU, *Carleson measures and multipliers for Dirichlet spaces*, J. Funct. Anal. 169 (1), 148–163 (1999).
- [24] K. YOSIDA, *Mean ergodic theorem in Banach spaces*, Proc. Imp. Acad. 14 (8), 292–294 (1938).
- [25] K. ZHU, *Analytic Besov spaces*, J. Math. Anal. Appl. 157, 318–336 (1991).
- [26] K. ZHU, *Operator theory on function spaces*, Marcel Dekker, New York, 1990.
- [27] K. ZHU, *Spaces of holomorphic functions in the unit ball*, Graduate Texts in Mathematics 226, Springer, New York, (2005).
- [28] N. ZORBOSKA, *Multiplication and Toeplitz operators on the analytic Besov spaces*, In: Begehr, H.G.W., Nicolosi, F. (eds.) *More Progress in Analysis: Proceedings of the 5th International Isaac Congress*, Catania, Italy, 25–30 July 2005, pp. 387–396. World Scientific, Singapore (2009).