

## COMMUTING AND SEMI-COMMUTING TOEPLITZ OPERATORS ON THE WEIGHTED HARMONIC BERGMAN SPACE

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*Abstract.* In this article, we show that two Toeplitz operators on the weighted harmonic Bergman space can commute only in the trivial case under certain conditions. The triviality here means a nonzero linear combination of their symbols is constant. Moreover, we give a characterization of semi-commuting Toeplitz operators with harmonic or analytic symbols.

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### REFERENCES

- [1] S. AXLER, P. BOURDON, AND W. RAMEY, *Harmonic function theory*, Springer-Verlag, New York, 1992.
- [2] S. AXLER AND Ž. ČUČKOVIĆ, *Commuting Toeplitz operators with harmonic symbols*, Integr. equ. oper. theory **14**, 1 (1991), 1–12.
- [3] S. AXLER, Ž. ČUČKOVIĆ, AND N. RAO, *Commutants of analytic Toeplitz operators on the Bergman space*, Proc. Amer. Math. Soc. **128**, 7 (2000), 1951–1953.
- [4] B. CHOE, H. KOO, AND Y. LEE, *Commuting Toeplitz operators on the polydisk*, Trans. Amer. Math. Soc. **356**, 5 (2004), 1727–1749.
- [5] B. CHOE, AND Y. LEE, *Commuting Toeplitz operators on the harmonic Bergman space*, Michigan Math. J. **46**, 1 (1999), 163–174.
- [6] B. CHOE, AND Y. LEE, *Pluriharmonic symbols of essentially commuting Toeplitz operators*, Illinois J. Math. **42**, 2 (1998), 280–293.
- [7] B. CHOE, AND K. NAM, *Note on commuting Toeplitz operators on the pluriharmonic Bergman space*, J. Korean Math. Soc. **43**, 2 (2006), 259–269.
- [8] Ž. ČUČKOVIĆ AND N. RAO, *Mellin transform, monomial symbols, and commuting Toeplitz operators*, J. Funct. Anal. **154**, 1 (1998), 195–214.
- [9] Y. LEE, *Pluriharmonic symbols of commuting Toeplitz type operators on the weighted Bergman spaces*, Canad. Math. Bull. **41**, 2 (1998), 129–136.
- [10] Y. LEE, AND K. ZHU, *Some differential and integral equations with applications to Toeplitz operators*, Integr. equ. oper. theory **44**, 4 (2002), 466–479.
- [11] I. LOUHICHI, AND L. ZAKARIASY, *On Toeplitz operators with quasihomogeneous symbols*, Arch. Math. **85**, 3 (2005), 248–257.
- [12] Y. LU, *Commuting of Toeplitz operators on the Bergman space of the bidisc*, Bull. Austral. Math. Soc. **66**, 2 (2002), 345–351.
- [13] S. OHNO, *Toeplitz and Hankel operators on the harmonic Bergman space*, RIMS Kokyuroku, 946 (1996), 25–34.
- [14] K. STROETHOFF, *Essentially commuting Toeplitz operators with harmonic symbols*, Can. J. Math. **45**, 5 (1993), 1080–1093.
- [15] D. ZHENG, *Commuting Toeplitz operators with pluriharmonic symbols*, Trans. Amer. Math. **350**, 4 (1998), 1595–1618.
- [16] K. ZHU, *Duality of Bloch spaces and norm convergence of Taylor series*, Michigan Math. J. **38**, 1 (1991), 89–101.