Nana, C.; Sehba, B. F.

Let $D = \mathbb{R}^n + i\Omega$, $n \geq 3$, be the tube domain over an irreducible symmetric cone $\Omega$ in $\mathbb{R}^n$ of rank $r$ with the determinant function $\Delta$. One of the main results of the paper concerns Toeplitz operators from a Bergman space $A_p^\alpha(D)$ into a Besov space $B_q^\beta(D)$. For a positive Borel measure $\mu$ on $D$, and $\nu > m := n/r - 1$, a Toeplitz operator $T_\nu^\mu$ is the integral operator defined for any function $f$ with compact support by

$$T_\nu^\mu f(z) = \int_D K_\nu(z, w)f(w)d\mu(w),$$

where $K_\nu$ is the weighted Bergman kernel.

Theorem 2.1. Suppose that $q \geq 2$, $1 < p \leq q < \infty$, and

$$\alpha, \beta, \nu > m, \quad \beta + \frac{q(\nu - \beta)}{q - 1} > m, \quad \nu > m + \frac{\beta - m}{q} - \frac{\alpha - m}{p}.$$

Define the numbers

$$\lambda = 1 + \frac{1}{p} - \frac{1}{q}, \quad \gamma = \lambda^{-1} \left( \nu + \frac{\alpha}{p} - \frac{\beta}{q} \right).$$

The following conditions are equivalent.

(i) The operator $T_\mu^\nu$ extends to a bounded operator from $A_p^\alpha(D)$ to $B_q^\beta(D)$;

(ii) There is a constant $C > 0$ such that for any $\delta \in (0, 1)$ and any $z \in D$ we have

$$\mu(B_\delta(z)) \leq C \Delta^{\lambda(\gamma + m + 1)}(Im z).$$

The boundedness of Toeplitz operators between Bergman spaces on the unit ball was studied earlier by Pau and Zhao. The authors adapt their idea to the case of the tube domains over irreducible cones.

Reviewer: Leonid Golinskii (Kharkov)

MSC:

32A35 $H^p$-spaces, Nevanlinna spaces of functions in several complex variables
32A07 Special domains in $\mathbb{C}^n$ (Reinhardt, Hartogs, circular, tube) (MSC2010)
47B35 Toeplitz operators, Hankel operators, Wiener-Hopf operators

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References:


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