

Gogatishvili, Amiran; Mustafayev, Rza; Ünver, Tuğçe**Embeddings between weighted Copson and Cesàro function spaces.** (English) Zbl 06819576

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Summary: In this paper, characterizations of the embeddings between weighted Copson function spaces $\text{Cop}_{p_1, q_1}(u_1, v_1)$ and weighted Cesàro function spaces $\text{Ces}_{p_2, q_2}(u_2, v_2)$ are given. In particular, two-sided estimates of the optimal constant c in the inequality

$$\left(\int_0^\infty \left(\int_0^t f(\tau)^{p_2} v_2(\tau) d\tau \right)^{q_2/p_2} u_2(t) dt \right)^{1/q_2} \leq c \left(\int_0^\infty \left(\int_t^\infty f(\tau)^{p_1} v_1(\tau) d\tau \right)^{q_1/p_1} u_1(t) dt \right)^{1/q_1},$$

where $p_1, p_2, q_1, q_2 \in (0, \infty)$, $p_2 \leq q_2$ and u_1, u_2, v_1, v_2 are weights on $(0, \infty)$, are obtained. The most innovative part consists of the fact that possibly different parameters p_1 and p_2 and possibly different inner weights v_1 and v_2 are allowed. The proof is based on the combination of duality techniques with estimates of optimal constants of the embeddings between weighted Cesàro and Copson spaces and weighted Lebesgue spaces, which reduce the problem to the solutions of iterated Hardy-type inequalities.

MSC:**46E30** Spaces of measurable functions (L^p -spaces, Orlicz spaces, Köthe function spaces, Lorentz spaces, rearrangement invariant spaces, ideal spaces, etc.)**26D10** Inequalities involving derivatives and differential and integral operators**Keywords:**

Cesàro and Copson function spaces; embedding; iterated Hardy inequalities

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