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Embedding of classical Lorentz type spaces involving weighted integral means

We characterize the optimal constant of embedding between classical Lorentz spaces defined with respect to different weighted means. That means we characterize the optimal (smallest possible) quantity C for which the inequality

$$\left(\int_0^\infty \left(\int_0^t f^*(s)^{p_1} u_1(s)\right)^{\frac{m_1}{p_1}} w_1(t)\mathrm{d}t\right)^{\frac{1}{m_1}} \leq C \left(\int_0^\infty \left(\int_0^t f^*(s)^{p_2} u_2(s)\right)^{\frac{m_2}{p_2}} w_2(t)\mathrm{d}t\right)^{\frac{1}{m_2}}$$

holds, in the case of $m_2 \geq p_2$. The proof relies on combination of duality argument and some known and brand new Hardy-type inequalities.