

## A note on two-weight inequalities for multiple Hardy-type operators

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**Abstract.** Necessary and sufficient conditions on a pair of weights guaranteeing two-weight estimates for the multiple Riemann-Liouville transforms are established provided that the weight on the right-hand side satisfies some additional conditions.

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### 1. Introduction

In 1985 E. Sawyer [15] solved the two-weight problem for the two-dimensional Hardy transform

$$H_2 f(x, y) = \int_0^x \int_0^y f(t, \tau) dt d\tau, \quad x, y > 0.$$

Namely he proved the following statement:

**Theorem A.** *Let  $1 < p \leq q < \infty$ . Then for the boundedness of the operator  $H_2$  from  $L_w^p(\mathbb{R}_+^2)$  to  $L_v^q(\mathbb{R}_+^2)$  it is necessary and sufficient that the following three independent conditions are satisfied:*