



International scientific online seminar on  
 Analysis, Differential Equations and Mathematical Physics

Coordinators: Prof. Alexey Karapetyants, Prof. Vladislav Kravchenko

23rd July 2020, 5 pm (UTC+3)

Norm inequalities for linear and multilinear singular integrals on  
 weighted and variable exponent Hardy spaces

David Cruz-Uribe, OFS, The University of Alabama, USA, [dcruzuribe@ua.edu](mailto:dcruzuribe@ua.edu)

I will discuss recent work with Kabe Moen and Hanh Nguyen on norm inequalities of the form

$$T : H^{p_1}(w_1) \times H^{p_2}(w_2) \rightarrow L^p(w),$$

where  $T$  is a bilinear Calderón-Zygmund singular integral operator,  $0 < p, p_1, p_2 < \infty$  and

$$\frac{1}{p_1} + \frac{1}{p_2} = \frac{1}{p},$$

the weights  $w, w_1, w_2$  are Muckenhoupt weights, and the spaces  $H^{p_i}(w_i)$  are the weighted Hardy spaces introduced by Strömberg and Torchinsky.

We also consider norm inequalities of the form

$$T : H^{p_1(\cdot)} \times H^{p_2(\cdot)} \rightarrow L^{p(\cdot)},$$

where  $L^{p(\cdot)}$  is a variable Lebesgue space (intuitively, a classical Lebesgue space with the constant exponent  $p$  replaced by an exponent function  $p(\cdot)$ ) and the spaces  $H^{p_i(\cdot)}$  are the corresponding variable exponent Hardy spaces, introduced by me and Li-An Wang and independently by Nakai and Sawano.

To illustrate our approach we will consider the special case of linear singular integrals. Our proofs, which are simpler than existing proofs, rely heavily on three things: finite atomic decompositions, vector-valued inequalities, and the theory of Rubio de Francia extrapolation.

\*Seminar website: <https://rmc.sfedu.ru/seminar>. The seminar uses Microsoft Teams online platform. To join the seminar, please send a request to [pichugina@sfedu.ru](mailto:pichugina@sfedu.ru) (Olga Pichugina, scientific secretary).

The seminar is organized by the Regional Mathematical Center of the Southern Federal University in collaboration with Institute of Mathematics, Mechanics and Computer Sciences of the Southern Federal University and the special Interest ISAAC-OTHA group in Operator Theory and Harmonic Analysis.

**Региональный научно-образовательный математический центр**  
 Южный Федеральный Университет  
 Ростов-на-Дону

Regional Mathematical Center  
<https://rmc.sfedu.ru/>



Institute of Mathematics, Mechanics  
 and Computer Sciences  
<http://www.mmcs.sfedu.ru/>



Special Interest ISAAC-OTHA group in  
 Operator Theory and Harmonic Analysis  
<http://otha.sfedu.ru/isaac/>