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ACCEPTED MANUSCRIPT

MIXED MOTIVES AND MOTIVIC BIRATIONAL COVERS

PABLO PELAEZ

Dedicated to Professor Charles Weibel on the occasion of his 65th birthday.

Abstract. We introduce a tower of localizing subcategories in Voevodsky's big (closed under infinite coproducts) triangulated category of motives. We show that the tower induces a finite filtration on the motivic cohomology groups of smooth schemes over a perfect field. With rational coefficients, this finite filtration satisfies several of the properties of the still conjectural Bloch-Beilinson-Murre filtration.

1. Introduction

The main goal of this paper is to present an alternative approach to the conjectural Bloch-Beilinson-Murre filtration [Beĭ87], [Blo80], [Mur93] in the context of Voevodsky's triangulated category of motives DM. Traditionally, the Bloch-Beilinson-Murre filtration is understood as an outcome of the conjectural motivic t-structure [Beĭ87, p. 20-22], [Jan94, Conj. 4.8], [Ayo11]. Due to the lack of progress, it seems to the author that it is worth it to relax the conditions and look instead for a tower where the truncation functors are triangulated. The great advantage of this approach is that the finiteness of the proposed filtration follows in a straightforward way from the construction, whereas in the traditional approach this property seems to be the most inaccessible one [Sai96], [Sai00]. This method was introduced by Voevodsky in his successful approach to the spectral sequence relating motivic cohomology and algebraic K-theory [Voe02b], [Voe02c].

Our approach can be sketched quickly as follows. For a smooth scheme X of finite type over a perfect field k, the Chow groups can be computed in Voevodsky's triangulated category of motives DM [Voe02a]:

$$CH^q(X)_R \cong \mathrm{Hom}_{DM}(M(X)(-q)[-2q], \mathbf{1}_R);$$

where $CH^q(X)_R$ is the Chow group with R-coefficients, and $\mathbf{1}_R$ is the motive of a point with R-coefficients. Since DM is a triangulated category, it is possible to construct the filtration by considering a tower in DM, (see §5):

$$\cdots \to bc_{\leq -3}(\mathbf{1}_R) \to bc_{\leq -2}(\mathbf{1}_R) \to bc_{\leq -1}(\mathbf{1}_R) \to \mathbf{1}_R$$

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Key words and phrases. Bloch-Beilinson-Murre filtration, Chow Groups, Filtration on the Chow Groups, Filtration on Motivic Cohomology, Mixed Motives, Motivic Cohomology, Triangulated Category of Motives.

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