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A tropical approach to a generalized Hodge conjecture for positive currents

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Abstract. Demailly (2012) showed that the Hodge conjecture is equivalent to the statement that any (p,p)-dimensional closed current with rational cohomology class can be approximated by linear combinations of integration currents. Moreover, the statement that all strongly positive currents with rational cohomology class can be approximated by positive linear combinations of integration currents can be viewed as a strong version of the Hodge conjecture (1982). In this talk, I will explain the construction of a current which does not verify the latter statement on a toric variety, where the Hodge conjecture is known to hold. The example belongs to the family of 'complex tropical currents', which we extend their framework to toric varieties, discuss their extremality properties, and express their cohomology classes as recession fans of their underlying tropical varieties. Finally, the counter-example will be the tropical current associated to a 2-dimensional balanced subfan of a 4-dimensional toric variety, whose intersection form does not have the right signature in terms of the Hodge index theorem. This is a joint work with June Huh.
