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Let X be a smooth, projective variety over a number field and \mathcal{X} be a regular model of X defined over the ring of integers \mathcal{O}_K of K . Let \mathcal{P} be a prime ideal of \mathcal{O}_K and assume that the fibre over \mathcal{P} , denoted by Y is a reduced normal crossing divisor and that the residue field $k(\mathcal{P})$ is finite.

Let N be the logarithm of the monodromy operator, which is assumed to be unipotent around \mathcal{P} . Then N defines a class in $\mathbb{H}^{2d}((X \times X)_{\bar{K}}, \mathbb{Q}(d-1))$ and Kato conjectured that, under certain conditions, N corresponds to an algebraic cycle on Y . This was proved by Consani and Consani-Kim in certain cases.

We develop this further: we show that one can in fact, associate a (higher) algebraic cycle to N on X , thus proving that N is motivic. (Received September 13, 2010)