

Colliot-Thélène, Jean-Louis; Sansuc, Jean-Jacques; Swinnerton-Dyer, Peter
Intersections of two quadrics and Châtelet surfaces. II. (English) Zbl 0622.14030
J. Reine Angew. Math. 374, 72-168 (1987).

This is the second part of the memoir reviewed above. Most of this part is devoted to the study of the arithmetic of Châtelet surfaces, which are smooth projective models $X = X(\alpha, P)$ of affine surfaces $y^2 - \alpha z^2 = P(x)$, where α is a nonzero constant and $P(x)$ is a separable polynomial of the fourth degree. These surfaces occupy an important class in the classification of rational surfaces. They have been also used in a joint paper of *A. Beauville* and the authors [*Ann. Math.*, II. Ser. 121, 283-318 (1985; [Zbl 0589.14042](#))] to construct a counterexample to Zariski's conjecture on stable rationality. Among many other important results the authors prove the following: (i) if $P(x)$ is irreducible then $X(\alpha, P)$ satisfies the Hasse principle and, if moreover $X(k) \neq \emptyset$, the weak approximation; (ii) the only obstruction to the Hasse principle for X is the Brauer-Manin obstruction; (iii) the number of \mathbb{R} -equivalence classes on $X(k)$ is effectively computable; (iv) if $a \in X(k)$, then the map $x \rightarrow x-a$ induces a bijection between the finite set $X(k)/\mathbb{R}$ and the group $A_0(X)$ of 0-cycles of degree 0 on X modulo rational equivalence; (v) a universal torseur \mathcal{T} over $X(\alpha, P)$ with $\mathcal{T}(k) \neq \emptyset$ is k -rational.

Some of the results from the both parts of the paper were earlier announced in *C. R. Acad. Sci., Paris, Sér. I* 298, 377-380 (1984; [Zbl 0575.14044](#)) and also were surveyed by *Y. Manin* and *M. Tsfasman* in *Usp. Mat. Nauk* 41, No.2, 43-94 (1986).

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MSC:

[14J25](#) Special surfaces
[14M17](#) Homogeneous spaces and generalizations
[14M10](#) Complete intersections

Cited in **10** Reviews
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Keywords:

arithmetic of Châtelet surfaces; Hasse principle; weak approximation; Brauer-Manin obstruction; 0-cycles; rational equivalence; universal torseur

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