



Refining Castelnuovo-Halphen bounds

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Fix integers r, d, s, π with $r \geq 4$, $d \geq s$, $r-1 \leq s \leq 2r-4$, and $\pi \geq 0$. Refining classical results for the genus of a projective curve, we exhibit a sharp upper bound for the arithmetic genus $p_a(C)$ of an integral projective curve $C \subset \mathbb{P}^r$ of degree d , assuming that C is not contained in any surface of degree $\leq s$, and not contained in any surface of degree s with sectional genus $> \pi$. Next we discuss other types of bound for $p_a(C)$, involving conditions on the entire Hilbert polynomial of the integral surfaces on which C may lie.

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