Genus 3 hyperelliptic curves with (2, 4, 4)-split Jacobians

Tony Shaska
Department of Mathematics and Statistics
Oakland University
shaska@oakland.edu

Abstract

We study degree 2 and 4 elliptic subcovers of hyperelliptic curves of genus 3 defined over the complex field. The family of genus 3 hyperelliptic curves which have a degree 2 cover to an elliptic curve $E$ and degree 4 covers to elliptic curves $E_1$ and $E_2$ is a 2-dimensional subvariety of the hyperelliptic moduli $H_3$. We determine this subvariety explicitly. For any given moduli point $p$ in $H_3$ we determine explicitly if the corresponding genus 3 curve $X$ belong or not to such family. When it does, we can determine elliptic subcovers $E$, $E_1$, and $E_2$ in terms of the absolute invariants $t_1$ ... $t_6$. This variety provides a new family of hyperelliptic curves of genus 3 for which the Jacobians completely split.