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Christopher Athorne* (ca@maths.gla.ac.uk), Department of Mathematics, University Gardens, Glasgow, G14 9LZ, Scotland. *Identities for \wp -functions.*

We discuss relations between \wp -functions defined on Jacobian varieties associated with plane algebraic curves of genus g . These relations generalise the Weierstrass equation on the non-singular cubic: $\wp'^2 = 4\wp^3 - g_2\wp - g_3$. Generalised relations for certain classes of curves up to genus 6 have been obtained in the literature using the classical approach of balancing singularities in the \wp -functions and their derivatives implemented with powerful symbolic computation.

A modification of this approach utilizes elementary representation theory to isolate certain highest-weight relations amongst \wp -functions from which the other relations can be derived [Athorne, C., J. Phys. A 41 (2008), no. 41]. The representations arise from continuous families of birational maps between curves which make the vector space of holomorphic differentials on the curve into a (generally reducible) $\mathfrak{sl}_2(\mathbb{C})$ module.

This approach is implemented for hyper-elliptic curves of genus 1,2 and 3.

The pay-offs of the representation theoretic approach are: the computational cost is greatly reduced; the relations are ordered in such a way that their structure is more transparent; the connection with the underlying geometry is preseved. (Received September 21, 2010)