# On Littlewood and Newman polynomial multiples of Borwein polynomials

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A Newman polynomial has all the coefficients in $\{0, 1\}$ and constant term 1, whereas a Littlewood polynomial has all coefficients in $\{-1, 1\}$. We call $P(X) \in \mathbb{Z}[X]$ a *Borwein* polynomial if all its coefficients belong to $\{-1, 0, 1\}$ and $P(0) \neq 0$. We exploit an algorithm developed previously by Lau and Stankov in their research on *the spectra of numbers* and independently by Akiyama, Thuswaldner and Zaïmi in their study of *Height Reducing Property.* The algorithm decides whether a given monic integer polynomial with no roots on the unit circle $|z| = 1$ has a non-zero multiple in $\mathbb{Z}[X]$ with coefficients in a finite set $\mathcal{D} \subset \mathbb{Z}$. Our results are as follows. For every Borwein polynomial of degree $\leq 9$ we determine whether it divides any Littlewood or Newman polynomial. We show that every Borwein polynomial of degree $\leq 8$ which divides some Newman polynomial divides some Littlewood polynomial as well. For every Newman polynomial of degree $\leq 11$, we check whether it has a Littlewood multiple, extending the previous results of Borwein, Hare, Mossinghoff. We find examples of polynomials whose products and squares have no Littlewood or Newman multiples, while the original polynomials possess such multiples. Described results were presented in the paper "On Littlewood and Newman polynomial multiples of Borwein Polynomials" by P. Drungilas, J. Jankauskas and J. vSiurys (to appear in AMS *Mathematics of Computation*).