# Non-real zeroes of homogeneous differential polynomials and a generalisation of the Laguerre and Newton inequalities

by

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Given a real polynomial $p(z)$ with only real zeroes, we estimate the number of non-real zeroes of the differential polynomial

$$F_{\varkappa}[p](z) = p(z)p''(z) - \varkappa[p'(z)]^2,$$

where $\varkappa$ is a real number.

A counterexample to a conjecture by B. Shapiro on the number of real zeroes of the polynomial $F_{\frac{n-1}{n}}[p](z)$ in the case when the real polynomial $p(z)$ of degree $n$ has non-real zeroes is constructed.

We also discuss other generalisations of the Hawaii conjecture and possible extensions of our result to entire functions.

The talk is based on a joint work with Mohamed J. Atia.