Unimodality for certain families of Frobenius seaweed algebras.

If $g$ is a Frobenius Lie algebra, then for certain $F \in g^*$ the natural map $g \to g^* \text{ given by } x \to F[x, -]$ is an isomorphism. The inverse image of $F$ under this isomorphism is called a principal element. It has recently been established that if $g$ is a Frobenius seaweed subalgebra of a classical Lie algebra, then the spectrum of the adjoint of a principal element consists of an unbroken set of integers whose multiplicities have a symmetric distribution. Extensive simulation suggest that the spectrum is unimodal – but the proof has been elusive in all classical types. Here, we establish unimodality in type A for certain families of maximal parabolic Frobenius seaweeds. We further provide explicit formulas to compute dimensions, yielding logarithmically concave sequences.

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