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On the Representation of the Natural Numbers by Powers of the Golden Mean,

Abstract

In a base phi representation, a natural number is written as a sum of powers of the golden mean φ. There are many ways to do this. Well known is the standard representation, introduced by George Bergman in 1957, where a unique representation is obtained by requiring that no consecutive powers, φ^n and φ^{n+1}, occur in the representation. In this paper, we introduce a new representation by allowing that the powers φ^0 and φ^1 may occur at the same time, but no other consecutive powers. We then argue that this representation is much closer to the classical representation of the natural numbers by powers of an integer than Bergman's standard representation.