On Numbers Whose Integer Parts of Powers Are Always Composite

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It is known that there are countably many non-integers $\alpha > 1$ which possess the property that $\lfloor \alpha^n \rfloor$ is not a prime for all integers $n \geq 1$. There are however very few known explicit examples of such numbers. A Pisot number is an algebraic integer $\alpha > 1$ all whose conjugates are of modulus less than 1. The degree of a Pisot number is the degree of its minimal polynomial. In this paper we exhibit infinitely many explicit quadratic, cubic, and quartic Pisot numbers α for which $\lfloor \alpha^n \rfloor$ is composite for all positive integers n. Moreover, we prove that for every $d \geq 2$ where there exist infinitely many Pisot numbers of degree d which have the desired property.

Awards Won:

Lawrence Technological University: STEM Scholar Award, a tuition scholarship of $19,650 per year, renewable for up to four years and applicable to any major

National Security Agency Research Directorate : Third Place Award “Mathematics”