

A Discovery of the Dual Sequential Pattern of Prime Numbers in $P \times P$: Applications in a Formal Proof of the Twin-Prime Conjecture

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Abstract : This work presents basic research on the recursive structures and dual sequential patterns of primes for the formal proof of the Twin-Prime Conjecture (TPC). A rigorous methodology of Twin-Prime Decomposition (TPD) is developed in MATLAB to inductively verify potential twins in the dual sequences of primes. The key finding of this basic study confirms that the dual sequences of twin primes are not only symmetric but also infinitive in the unique base 6 cycle, except a limited subset of potential pairs is eliminated by the lack of dual primality. Both theory and experiments have formally proven that the infinity of twin primes stated in TPC holds in the $P \times P$ space.

Keywords : number theory, primes, twin-prime conjecture, dual primes ($P \times P$), twin prime decomposition, formal proof, algorithm

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