

1129-05-244

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The T -system is a certain discrete dynamical system associated with a quiver. Keller showed in 2013 that the T -system is periodic when the quiver is a product of two finite Dynkin diagrams. We prove that the T -system is periodic if and only if the quiver is a finite \boxtimes finite quiver. Such quivers have been classified by Stembridge in the context of Kazhdan-Lusztig theory. We show that if the T -system is linearizable then the quiver is necessarily an affine \boxtimes finite quiver. We classify such quivers and conjecture that the T -system is linearizable for each of them. Next, we show that if the T -system has algebraic entropy zero then the quiver is an affine \boxtimes affine quiver, and classify them as well. For the octahedron and the cube recurrence, we prove the converse direction of each of the three statements using explicit formulas due to Speyer and Carroll combined with our general linearizability result for cylindrical networks. (Received March 17, 2017)