

When is a linear system conservative?

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We derive a number of equivalent conditions for a linear system to be energy preserving and hence, in particular, well-posed. Similarly, we derive equivalent conditions for a system to be conservative, which means that both the system and its dual are energy preserving. For systems whose control operator is one-to-one and whose observation operator has dense range, the equivalent conditions for being conservative become simpler, and reduce to three algebraic equations.

Keywords: Conservative system, energy preserving system, well-posed linear system, regular linear system, operator node, Cayley transform.