Local and Global Lyapunov Exponents in a Discrete Mass Waterwheel
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A generic Jacobian is calculated to obtain the Lyapunov exponents Malkus’ system. However complete, the Lyapunov exponents obtained from the Jacobian do not appropriately show the distinction between chaos and order. A further explanation for this is required. We show how the waterwheel equations, chaotic as a whole, can be decomposed into a series of convergent equations. Chaos will then come in from the transition between any two of these convergent equations. We finally use a common numerical method, not based on the Jacobian, to obtain Lyapunov exponents that properly make the distinction between chaos and order.