the string, that is to say, x as a function of i and the kinetic energy as a function i were analyzed periodically in Fourier series. Since the problem can be considered one of dynamics, this analysis amounts to a Lagrangian change of variables: instead of the original $\dot{x}_i$ and x_i, $i = 1, 2, \ldots 64$, we may introduce a_k and $\dot{a}_k$, $k = 1, 2, \ldots 64$, where

$$a_k = \sum x_i \sin \frac{ik\pi}{64} . \tag{4}$$

The sum of kinetic and potential energies in the problem with a quadratic force is

$$E_{x_i}^{kin} + E_{x_i}^{pot} = \frac{1}{2} \dot{x}_i^2 + \frac{(x_{i+1} - x_i)^2 + (x_i - x_{i-1})^2}{2} \tag{5a}$$

$$E_{a_k}^{kin} + E_{a_k}^{pot} = \frac{1}{2} \dot{a}_k^2 + 2a_k^2 \sin^2 \frac{\pi k}{128} \tag{5b}$$

if we neglect the contributions to potential energy from the quadratic or higher terms in the force. This amounts in our case to at most a few per cent.

The calculation of the motion was performed in the x variables, and every few hundred cycles the quantities referring to the a variables were computed by the above formulas. It should be noted here that the calculation of the motion could be performed directly in a_k and $\dot{a}_k$. The formulas, however, become unwieldy and the computation, even on an electronic computer, would take a long time. The computation in the a_k variables could have been more instructive for the purpose of observing directly the interaction between the a_k's. It is proposed to do a few such calculations in the near future to observe more directly the properties of the equations for $\ddot{a}_k$.

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