Wave equations with time dependent coefficients

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The total energy of the wave equation is conserved with respect to time if the propagation speed is a constant, but it is not true in general for time dependent propagation speeds. Indeed, it is considered in [F. Hirosawa, Math. Ann. 339 (2007), 819-839] that the following properties of the propagation speed are crucial for the estimates of the total energy: oscillating speed, difference from the mean, and the smoothness in C^m category. The main purpose of our talk paper is to derive a benefit of a further smoothness of the propagation speed in the Gevrey class for the energy estimates.