

Suppose $n > 1$ is an odd integer, f is a smooth function supported in a ball B with boundary S , and u is the solution of the initial value problem

$$\begin{aligned} u_{tt} - \Delta_x u &= 0, & (x, t) \in R^n \times [0, \infty); \\ u(x, t=0) &= 0, & u_t(x, t=0) = f(x), & x \in R^n. \end{aligned}$$

We characterize the range of the map $f \mapsto u|_{S \times [0, \infty)}$ and give a stable scheme for the inversion of this map. This also characterizes the range of the map sending f to its mean values over spheres centered on S .

We will discuss the motivation for this problem, past results, and give an idea of the proof of the range characterization. This is based on work done with David Finch of Oregon State University.