1046-35-1925 **Kyle S Hickmann*** (`hickmank@math.oregonstate.edu`), Department of Mathematics, Kidder Hall 368, Oregon State University, Corvallis, OR 97331. *The Unique Determination of an Acoustic Speed from Thermoacoustic Tomography Data.*

A new result pertaining to a mostly unexplored uniqueness question in thermoacoustic tomography is presented. We demonstrate a partial answer to the question, If $u_1(x,t)$ and $u_2(x,t)$ satisfy

$$\begin{aligned} \partial_t^2 u_1 - c_1^2(x)\Delta u_1 &= 0 \text{ in } \mathbb{R}^n \times \mathbb{R}_+ \\ \partial_t^2 u_2 - c_2^2(x)\Delta u_2 &= 0 \text{ in } \mathbb{R}^n \times \mathbb{R}_+ \\ u_1(x,0), u_2(x,0) &\in C_0^\infty(D), \\ \partial_t u_1(x,0) = 0 &= \partial_t u_2(x,0) \text{ in } \mathbb{R}^n \\ u_1(x,t) &= u_2(x,t) \text{ on } \partial D \times \mathbb{R}_+ \end{aligned}$$

then is $c_1(x) = c_2(x)$ in D? Here $D \subset \mathbb{R}^n$ is bounded, convex and the acoustic speeds are assumed to be smooth and equal to 1 outside of D with $c_1(x) - c_2(x) \geq 0$ in D. Also, it is assumed that one of the sound speeds is non-trapping and the dimension n is odd. In this case we can conclude that $u_1(x,0) = u_2(x,0)$ in D as well. We use the relation of the wave equation to the Helmholtz equation and decay estimates for the wave equation to show that uniqueness of the sound speed is connected to the interior transmission problem. (Received September 16, 2008)