1046-85-1012 **Christopher J Winfield*** (winfielc@uwosh.edu), Mathematics Dept., 800 Algoma Boulevard, Oshkosh, WI 54901. *Type Ia Supernova Luminosity Data and the LTB Model: A Well-posedness Problem.* Preliminary report.

Solutions to the Einstein equation given by the spherically symmetric Lemaître-Tolman-Bondi metric (on $\mathbb{R}^4$) are studied where data is prescribed in terms of a so-called redshift parameter $z \geq 0$. As such solutions are characterized by functions $E(r)$, $M(r)$, and $R(t,r)$ satisfying

$$\left(\frac{\partial_t R}{R}\right)^2 = \frac{2E}{R^2} + \frac{2M}{R^3},$$

we study maps of the form $\{E(r(z)), D_L(z), R(0, r(z))\} \to M(r(z))$ for observable $D_L(z)$ [Chung, Romano: arXiv:astro-ph/0608403v1]. Here D_L is incorporated into the solution by $D_L(z) = (1+z)^2 R(t(z), r(z))$ where $(t(z), r(z))$ lie on certain null (photon) geodesics (i.e. $ds^2 = 0$). We investigate the well-posedness of the resulting system of ordinary differential equations

$$\frac{dr}{dz} = \frac{\sqrt{1 + 2E(r(z))}}{(1+z)\partial_t \partial_r R(t(r), r(z))}$$
$$\frac{dt}{dz} = \frac{|\partial_r R(t(z), r(z))|}{(1+z)\partial_t \partial_r R(t(r), r(z))}.$$

We further discuss possible directions and how our investigation pertains to cosmological models such as dark-energy, inhomogeneous matter distribution, and the cosmological constant. (Received September 16, 2008)