1047-35-386 **Nicolae Tarfulea*** (`tarfulea@calumet.purdue.edu`), Purdue University Calumet, 2200 169th Street, Hammond, IN 46323. *Exterior Boundary-Value Problem with Application in General Relativity.*

In this talk, we will address the exterior boundary-value problem $-\Delta u = H(x)f(u)$ in $\Omega := \mathbf{R}^n \setminus \overline{B}(0, r_0)$, $\frac{\partial u}{\partial n} + au = \gamma$ on $\partial\Omega$, and $u(x) \to 0$ as $|x| \to \infty$. When $a > 0$, the Robin boundary condition has a "wrong" sign, and this makes the analyis of the problem interesting and non-trivial. The important model case $f(u) = (u + 1)^{-7}$, $a = 1/(2r_0)$, and $\gamma = -1/(2r_0)$, is related to the initial data problem in general relativity. For this model case, as an example of application of our results, we obtain the existence and uniqueness of the conformal factor corresponding to the Hamiltonian constraint equation in the case of a single black hole in the radial symmetric regime. (Received February 02, 2009)