Generalized Friedmann branes László Á. Gergely Laszlo.Gergely@port.ac.uk or gergely@physx.u-szeged.hu
Institute of Cosmology and Gravitation, University of Portsmouth, Portsmouth PO1 2EG, UK

abstract We prove that for a large class of generalized Randall-Sundrum II type models the characterization of brane-gravity sector by the effective Einstein equation, Codazzi equation and the twice-contracted Gauss equation is equivalent with the bulk Einstein equation. We give the complete set of equations in the generic case of non-$Z_2$-symmetric bulk and arbitrary energy-momentum tensors both on the brane and in the bulk. Among these, the effective Einstein equation contains a varying cosmological constant and two new source terms. The first of these represents the deviation from $Z_2$ symmetry, while the second arises from the bulk energy-momentum tensor. We apply the formalism for the case of perfect fluid on a Friedmann brane embedded in a generic bulk. The generalized Friedmann and Raychaudhuri equations are given in a form independent of both the embedding and the bulk matter. They contain two new functions obeying a first order differential system, both depending on the bulk matter and the embedding. Then we focus on Friedmann branes separating two non-identical (inner or outer) regions of Reissner-Nordström-Anti de Sitter bulk space-times, generalizing previous non-$Z_2$-symmetric treatments. Finally the analysis is repeated for the Vaidya-Anti de Sitter bulk space-time, allowing for both ingoing and outgoing radiation in each region.