The Structure of the Big Bang from
Sanjeev S. Seahra [Email: ssseahra@uwaterloo.ca] Paul S. Wesson [Email: wesson@astro.uwaterloo.ca]
http://astro.uwaterloo.ca

Department of Physics, University of Waterloo,
2pt *∂ * α
0.15 0.6

abstract
We give relations for the embedding of spatially-flat Friedmann-Robertson-Walker cosmological models of Einstein’s theory in flat manifolds of the type used in Kaluza-Klein theory. We present embedding diagrams that depict different 4D universes as hypersurfaces in a higher dimensional flat manifold. The morphology of the hypersurfaces is found to depend on the equation of state of the matter. The hypersurfaces possess a line-like curvature singularity infinitesimally close to the $t = 0^+$ 3-surface, where $t$ is the time expired since the big bang. The family of timelike comoving geodesics on any given hypersurface is found to have a caustic on the singular line, which we conclude is the 5D position of the point-like big bang.