3+2 Cosmology: the general solution

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The Cosmological Principle is applied to a 5D Ricci-flat (bulk) manifold with two time-dimensions. The general solution is given explicitly in the form of a single metric, namely 'M-metric', for every sign of the space curvature. Friedmann-Robertson-Walker (FRW) metrics are obtained by projecting the 'mother' M-metric onto specific 3+1 (brane) hypersurfaces (top-down approach)

The result can also be viewed, from a bottom-up approach, as the explicit form of the general solution of the embedding of generic FRW metrics in a 5D manifold. One can then address the completeness problem. Contrary to the general belief, the relativistic extension of Campbell's theorem does not ensure that every FRW metric can be embedded in a 3+2 Ricci-flat manifold.