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Brane-world singularities in a fluid bulk

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We present new results on the singularity structure and asymptotic analysis of a brane-world that consists of a flat 3-brane embedded in a five-dimensional bulk. The bulk matter is modelled by a fluid that satisfies a non-linear equation of state of the form $p = \gamma\rho^{\lambda}$, where p is the 'pressure' and ρ is the 'density' of the fluid. We show that for appropriate ranges of the parameters γ and λ, it is possible to construct a regular solution, compatible with energy conditions, that successfully localizes gravity on the brane. These results improve significantly previous findings of the study of a bulk fluid with a linear equation of state.

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