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Covariant actions for bouncing cosmology in modified Gauss-Bonnet gravity theories

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Cyclic universes with bouncing solutions are candidates for solving the big bang initial singularity problem. Here I will look for bouncing solutions in the context of modified Gauss-Bonnet gravity theories whose field equations contain up to fourth-order derivatives of the metric tensor. In finding such bouncing solutions I will resort to an order reduction technique that reduces the order of the differential equations of the theory to second-order and thus enables one to find solutions which are perturbatively close to general relativity. I will also build the covariant effective actions of the resulting order reduced theories.

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