

# A Construction of Spaces of Compatible Differential Forms on Cellular Complexes

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Given a cellular complex (such as a subset of Euclidean space divided into polyhedra) we construct spaces of differential forms which form a complex under the exterior derivative, which is isomorphic to the cochain complex of the cellular complex: The space of  $k$ -forms has a basis indexed by the set of  $k$ -dimensional cells and in these bases the matrix of the exterior derivative is given by the incidence numbers. In the framework of mimetic finite differences the construction provides a conforming reconstruction operator. The construction applies in particular to cellular complexes that are duals of simplicial grids, generalizing previous work of A. Buffa and the author to any dimension.