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Douglas Arnold, Richard Falk, Johnny Guzmán and Gantumur Tsogtgerel*
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In 1976, Dodziuk and Patodi employed Whitney forms to define a combinatorial coderivative operator which is defined on cochains, and they raised the question whether the combinatorial coderivative is consistent in the sense that for a smooth enough differential form the combinatorial coderivative of the associated cochain converges to the exterior coderivative as the triangulation is refined. In 1991, Smits proved this to be the case in two-dimensions assuming that the initial triangulation is refined in a completely regular fashion, by dividing each triangle into four similar triangles. In this work we extend Smits result to arbitrary dimensions, showing that the combinatorial coderivative is consistent for 1-forms if the triangulations possess a large degree of local symmetry. We also show that this restriction on the triangulations is needed, giving a counterexample in which a slightly less regular refinement procedure, namely Whitney's standard subdivision, is used. (Received September 12, 2012)