Hence the bracket symbols form a semi-ring. The commutative law of addition does not hold in general in this semi-ring since

$$[A, \beta] + [B, \gamma] = [AB, \beta + \gamma],$$
$$[B, \gamma] + [A, \beta] = [BA, \gamma + \beta],$$

but $BA \neq AB$. These symbols have a property under addition which might be called quasi-commutativity:

$$[\alpha, \beta] + [\alpha, \beta] + [\gamma, \delta] + [\gamma, \delta] = [\alpha, \beta] + [\gamma, \delta] + [\alpha, \beta] + [\gamma, \delta],$$

for the left-hand member reduces to $[\gamma, \beta+\beta+\delta+\delta]$ and the right to $[\gamma, \beta+\delta+\beta+\delta]$, which are equal since A, B, and C are commutative under addition. It is also easy to see that $MNMN = MMNN$, for M and N are bracket symbols.

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BRANCHED AND FOLDED COVERINGS*

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A simple example of a *branched* covering arises when one sphere is mapped on another so that each point of the first sphere goes into the point of the second which has the same latitude but double the longitude. This is a covering of degree two with simple branching at the north and south poles. As an example of a *folded* covering we take a torus, thought of as a sphere with a handle on one side, and project it radially inward on a smaller concentric sphere. The torus covers the sphere once but with a fold produced by collapse of the handle. The product of this torus-sphere covering with the previous sphere-sphere covering yields a torus-sphere covering of degree two which is both *branched and folded*. Suitable triangulation of the torus and the spheres will turn the above mappings into simplicial mappings in which each simplex maps barycentrically into a simplex of the same dimension. In what follows we make some rudimentary calculations concerning the branching and folding of a simplicial covering of one n-dimensional complex by

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