1007-52-231 **Carsten Lange*** (lange@math.tu-berlin.de), Institut Mittag-Leffler, Auravagen 17, 18260 Djursholm, Sweden. *A proof of Forman's combinatorial Weitzenböck decomposition and a combinatorial Gauß-Bonnet theorem.*

We introduce a *combinatorial difference operator* on CW-complexes that enables us to derive purely combinatorial analogues of the *rough Laplacian*, the *Riemannian curvature tensor*, and the *Ricci curvature* on a smooth manifold. The constructions involved mimic the constructions known in differential geometry.

As a consequence, we obtain the Weitzenböck decomposition of the combinatorial Laplace operator postulated by Forman to define a *combinatorial Ricci curvature*. This combinatorial curvature has been used by Forman to prove combinatorial analogues of Bochner's and Myers' theorems.

If we consider a weighted CW-complex, the combinatorial Weitzenböck formula still holds, but it may be different from Forman's proposal. For a specific choice of such weights on a combinatorial 2-manifold, a combinatorial version of the classical Gauß–Bonnet theorem can be proved. (Received February 22, 2005)