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Cartesian Powers of Shapes of FANR's and Polyhedra

The Cartesian product Sh(X) $\times$ Sh(Y) of the shapes of compacta X and Y is defined as Sh$(X \times Y)$. Then Sh(X) and Sh(Y) are called factors of Sh$(X \times Y)$. Similarly one defines product and factors of pointed shapes of compacta, and factors in the homotopy category.

We prove that, if $(X, x) \in FANR$ and Sh$^n(X, x)$ =Sh(X, x), for some $2 \leq n \in N$, then Sh$(X, x) = 1$. This resolves positively a problem of J. Dydak, A. Kadlof, S. Nowak [3]. Furthermore, if $(X, x) \in FANR$, then (X, x) cannot be a proper factor of itself.

The same results we get for polyhedra in the homotopy category of CW-complexes. (In particular, on $ANR's$ shape and homotopy theory coincide.)

Thus, the answer to the following question of K. Borsuk [2] is positive: Is it true that if $X \in ANR$ and Sh$^n(X, x)$ =Sh(X, x), for some $2 \leq n \in N$, then $X \in AR$? An equivalent problem was also published in [1, Problem (7.13), p. 142].

Some related results and open problems in the homotopy category of CW-complexes, in the shape category of compacta, and on finitely presented groups, are also discussed.

REFERENCES

[1] K. Borsuk, Theory of Shape, Polish Scientific Publishers 59, Warsaw, 1975.

[2] K. Borsuk, Theory of Shape, Lecture Notes Series, 28. Matematisk Institut, Aarhus Universitet, Aarhus, 1971.

[3] J. Dydak, A. Kadlof, S. Nowak, Open Problems in Shape Theory, University of Warsaw, 1981.