A System of Rotational Hyperplanes and a Simple Polytopal Path in Convexity

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We propose a hyperplane rotational system to be applied as a basic unifying tool in the study of convex sets and polytopes. The system that somehow is similar to the Cartesian system of coordinates in the Euclidean space, has already been used as a main technique to bridge between convex polytopes and threshold logic. We reprove three basic results on convex sets and polytopes by applying this system. The first one is on the supporting hyperplanes for compact convex sets and then we present new proofs for two basic theorems on facial properties of simple polytopes. Finally, we show how this approach may be used as a dual-free simple polytopal path in the study of convex sets and polytopes

Keywords: Convex sets, convex polytopes, hyperplanes.