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Morphometry and structure of natural random tilings[1] PRIMOZ ZIHERL, University of Ljubljana, ANA HOCEVAR, SAMIR EL SHAWISH, Jozef Stefan Institute — To better understand the observed universality of their structure, we analyze the morphometry of a sizable set of living and inanimate planar cellular partitions including patterns seen in animal and plant tissues as well as in magnetic froths and geological formations. We characterize them by the distributions of polygon reduced area, a scale-free measure of the roundedness of polygons. The distributions extracted from experimental images are all fairly sharp and seem to belong to the same family. By comparing the frequencies of the polygon classes, we map the samples onto maximal-entropy model tilings of equal-area, equal-perimeter polygons [1]. We argue that the random two-dimensional patterns studied can be parametrized solely by their median reduced areas. The biological, mechanical, thermodynamical, or other processes which mold the cellular partitions are essential as generators of a certain preferred tile reduced area but beyond that, the structure of a tiling seems to be independent of its material existence.
[1] A. Hocevar and P. Ziherl, Degenerate polygonal tilings in simple animal tissues, Phys. Rev. E **80**, 011904 (2009).

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