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**Extrinsic homogeneity of non-cubic periodic minimal surface families** GERD E. SCHROEDER, Applied Maths, RSPhysSE, Australian National University, 0200 ACT, Australia, ANDREW FOGDEN, Institute for Surface Chemistry, P.O. Box 5607, SE-11486 Stockholm, Sweden, STEPHEN T. HYDE, Applied Maths, RSPhysSE, Australian National University, 0200 ACT, Australia — Infinite periodic minimal surfaces (IPMS) form the structural basis of cubic phases in copolymer, lipid or surfactant self-assemblies. Although few non-cubic equilibrium phases have been reported to date, there are compelling reasons to study non-cubic IPMS: first, they offer possible transition structures between bicontinuous cubic phases. Second, the reason why soft systems (that favour homogeneity but not explicitly symmetry) exhibit phases of cubic symmetry is still uncertain. We use the concept of *medial surfaces* to quantify *packing homogeneity*, i.e. variations of the channel radius within the structure. This analysis is carried out on IPMS families that are degradations of the cubic P, D and G surfaces (the rPD, rG, tG, tD tP, and H). We show that the cubic G and D are locally maximally homogeneous, whereas the cubic P has at least one relative that is more homogeneous. We discuss the implications for molecular self-assembly (chain stretching), and compare this result to analyses of curvature fluctuations.
G.E. Schöder, S.J. Ramsden, A. Fogden, S.T. Hyde, Physica A **339**, 137–144 (2004) and G.E. Schröder, S.J. Ramsden, A.G. Christy, S.T. Hyde, Eur. Phys. J. B **35**, 551–564 (2003)

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