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ON A SPACE-FILLING POLYHEDRON WITH 26 FACES.

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The number of faces of a space-filling polyhedron in R^n is bounded (Delone, 1961). For $n \leq 4$, the estimate used in Delone's prove, however, seems to give no accessible value for this maximal number. According to a conjecture by Brunner & Laves (1977), the upper limit is about 26 for n=3. The highest number of faces actually found in the past for a space-filling polyhedron is 24 (Koch & Fischer, 1972). This refers to the Dirichlet domain (Voronoi polyhedron) of a slightly distorted diamond configuration. The distortion is connected with the group-subgroup relation between Fd3m and $P4_1$. In the present study, an attempt has been made to derive Dirichlet domains with even more faces in an analogous way. For this, the Dirichlet domains of cubic point configurations (Koch, 1972) with a fairly high number of faces have been used as a starting point. As a result, space-filling polyhedra with 25 and 26 faces have been derived in $P4_132$ (general position) from a Dirichlet domain with 22 faces in $I4_132$ (1/8,x,1/4-x with x=0.1835). The type of Dirichlet domains with 26 faces exists in a narrow, but well-established array around 0.1440, 0.1825, 0.0635. (A detailed paper has been submitted to Geometriae Dedicata.)

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