

Quasicrystals and related approximant phases

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The study of quasicrystals has always been associated with the research of related approximant phases. Theoretically, the approximants of the quasicrystals are defined in the light of hyper dimensional crystallography. The approximants are periodic structures that arise from the projection of a hyper crystal along rational directions, whereas the corresponding quasicrystalline structures are projections along irrational directions. On the other hand, the approximants contain similar structure subunits to those of the corresponding quasicrystals, in many cases also exhibiting definite orientation relationships with the quasicrystals. Therefore, the approximant can be classified in two ways: 1) according to their projection schemes from hyper-crystals; and 2) according to the similarity in their basic structural units. The structural relationship between quasicrystals and approximants can be explained by phason strain. Various examples of quasicrystals and related approximants in Al-Cu-Fe, Al-Ni-Co and Mg-Zn-Y, and their relationships will be presented.