

## Microstructural Characterization of Metal Foams: An Examination of the Applicability of the Theoretical Models for Modeling Foams



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## MICROSTRUCTURAL CHARACTERIZATION OF METAL FOAMS: AN EXAMINATION OF THE APPLICABILITY OF THE THEORETICAL MODELS FOR MODELING FOAMS



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BiblioGov. Paperback. Book Condition: New. This item is printed on demand. Paperback. 24 pages. Dimensions: 9.7in. x 7.4in. x 0.1in. Establishing the geometry of foam cells is useful in developing microstructure-based acoustic and structural models. Since experimental data on the geometry of the foam cells are limited, most modeling efforts use an idealized three-dimensional, space-filling Kelvin tetrakaidecahedron. The validity of this assumption is investigated in the present paper. Several FeCrAlY foams with relative densities varying between 3 and 15 percent and cells per mm (c. p. mm. ) varying between 0. 2 and 3. 9 c. p. mm. were microstructurally evaluated. The number of edges per face for each foam specimen was counted by approximating the cell faces by regular polygons, where the number of cell faces measured varied between 207 and 745. The present observations revealed that 50 to 57 percent of the cell faces were pentagonal while 24 to 28 percent were quadrilateral and 15 to 22 percent were hexagonal. The present measurements are shown to be in excellent agreement with literature data. It is demonstrated that the Kelvin model, as well as other proposed theoretical models, cannot accurately describe the FeCrAlY foam cell structure. Instead, it is suggested that the ideal foam cell geometry consists of 11 faces with three quadrilateral, six pentagonal faces and two hexagonal faces consistent with the 3-6-2 Matzke cell. A compilation of 90 years of experimental data reveals that the average number of cell faces decreases linearly with the increasing ratio of quadrilateral to pentagonal faces. It is concluded that the Kelvin model is not supported by these experimental data. This item ships from La Vergne, TN. Paperback.



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