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## Numerical study of the effects of irregular pores on transverse mechanical properties of unidirectional composites

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**ABSTRACT:** For investigating the effect of the irregular pores on transverse elastic properties of the unidirectional Carbon/Carbon (C/C) composites, a new strategy is proposed to generate the representative volume element (RVE) on the basis of scanning electron microscope (SEM) images, in which these pores are approximated as the polygons and the identical fibers are generated by using the RSA algorithm. A good agreement is achieved by comparing the effective elastic properties obtained from the FEM-homogenization techniques to those predicted by experimental tests and two-step Mori-Tanaka method. FEM results indicate that the convergence of the results is seen when the number of vertices of the polygon reaches 40 and the RVE edge length is eight times of the maximum pores size ( $L/l_{max}=8$ ). Meanwhile, the average departure from isotropy is below 5% and the UD composites can be considered as transverse isotropic. The effective transverse elastic properties would decrease with increase of the porosity and with increase of the pores clustering  $\eta_p$ .

**KEYWORDS:** Irregular pores/voids; Elastic properties; RVE; Carbon/Carbon composites; Computational mechanics

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