Modeling of the effect of the void shape on effective ultimate tensile strength of porous materials: numerical homogenization versus experimental results

M. Masmoudi , W. Kaddouri , T. Kanit , S. Madani , S. Ramtani , A. Imad

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Highlights

- Numerical homogenization technique and morphological analysis based on the finite element method used to compute mechanical properties of porous materials
- Considering 2D porous matrix containing random distribution of identical nonoverlapping circular or elliptical voids
- Several microstructure configurations obtained by varying the voids morphology and the porosity of the matrix
- The representative volume element is used in order to estimate the morphology effect of the voids on the effective ultimate tensile strength of the called lotus-type porous metals
- Confrontation of the obtained numerical results to an analytical model and experimental data is performed.
- A formula improving the Boccaccini model is proposed to estimate effective tensile strength of porous metals taking into account the voids morphology