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EVALUATION OF REPRESENTATIVENESS ASPECTS OF DIGITAL MATERIAL REPRESENTATION MODEL OF POROUS SINTERED MICROSTRUCTURES

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Designing process of new products is very often supported by application of advanced CAE (Computer Aided Engineering) systems usually based on the FE (Finite Element) method. However, in case of multiphase or sintered metallic materials, conventional modelling techniques are often not sufficient, because they do not include explicit information on sophisticated microstructure morphology. Thus, in order to obtain more detailed information, another class of approaches e.g. Digital Material Representation [1] models capable of taking into microstructure heterogeneities in an explicit manner have to be used.
The goal of the present study is evaluation of the minimum size of the DMR model that will be representative for a selected sintered metallic microstructure and will not increase computational cost at the same time.
The DMR model is created based on performed experimental investigation comprising systematic imagining technique applied to large surface area of investigated sintered microstructure. This large image is used to extract smaller areas, which are the base to generate DMR models with different dimensions as seen in Fig. 1.

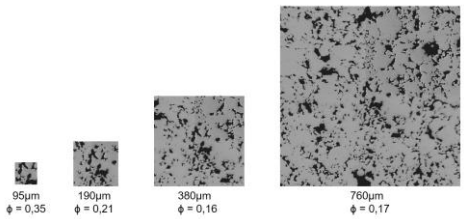

Figure 1. Relation between image size and porosity values

Finally, obtained images are binarized and transformed into finite element mesh with the format compatible with Abaqus FEA commercial software for evaluation of DMR model responses under loading conditions. As a result, conclusions regarding minimum size of the DMR model that can be considered representative are presented.

REFERENCES

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