A multiphase-field model for anisotropic brittle and ductile crack propagation in cast iron brake discs

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In trucks, brake discs made of cast iron are often used, which, in order to ensure the safety of road users, must satisfy the highest mechanical demands. To calculate the service life of brake discs, it is particularly important to consider crack growth.

The material considered in the presentation is cast iron with lamellar graphite and a pearlitic matrix. The perlitic matrix is assumed to be isotropic and ductile, whereas the graphite lamellae are considered to be brittle with an elliptical anisotropy. The phase-field model for crack propagation in multiphase systems by Schneider et al. [1] was extended in order to simulate cracking in the examined material. For the purpose of the model extension, a directional and plasticity dependent crack resistance was introduced. Validation examples of ductile and brittle anisotropic crack propagation are presented. By means of an exemplary cast iron structure, the applicability of the presented model to a multiphase system will be demonstrated.

REFERENCES

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