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# Neural-net Prediction of Stress Concentration at Fillets Using Stress Distribution Data Sets of Models without Defects

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A small fillet is one of complex shapes which is encountered in practical stress analysis by using a finite element method. It makes mesh generation difficult. In additon, we need to refine the meshes to evaluate stress concentration at the fillet. By contrast, it is easy to genetate meshes for a model without small fillets, but we have to evaluate stress singlularity at a sharp corner. In finite element analysis a zooming method is used to evaluate stress concentration[1], but the method requires additional analysis. It requires refined meshes and long calculation time to calucuate the stress concentration accurately. Analytical solutions for stress concentration factors at fillets are presented[2]. However, they are only applied to defined model shapes in defined loading conditions.

Therefore, we have developed the prediction method of stress concentrations at fillets in a model from stress distribution of the same model without them by using neural networks. We only once train the neural network by the relationship between the stress distribution at a sharp corner without a fillet and stress concentrations at various fillets of a representative model. The neural network could be applid to various model shapes in various loading conditions. We validated the method in two dimensional stress analysis. The method accurately predicted the stress concentration of the model which we didn't use to train the neural netework. It enables us to efficiently evaluate stress concentration of complex shapes with small fillets.

## REFERENCES

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