RUB steEl

Prof. Dr. Markus Knobloch

eEducation in steel structures

RUHR UNIVERSITÄT BOCHUM

RUB

Lehrstuhl für Stahl-, Leicht- und Verbundbau

MASTERARBEIT (MA BI)
MASTER THESIS (MA CE)

Shear buckling of steel and composite plate girders

Plate girders are structural elements frequently used in constructions to address the challenges of structural design involving heavy loads and/or long spans. This feature makes plate girders the structural members of the first choice for transfer beams to provide column-free floor space for buildings, and primary structural elements in small to medium span bridges. Steel-plate girders are fabricated by connecting narrow flanges and slender web plates with welded joints. These girders are used frequently in combination with a concrete slab that is connected to the girder with shear studs to form and act as a steel-concrete composite section. As a consequence of the slender cross-sectional proportions, the webs of plate girders are highly susceptible to out-of-plane shear buckling.

In this master thesis, the student should analyze the behavior of steel and steel-concrete composite girders subjected to shear loading at ambient temperature and in fire scenario. The numerical model should be developed using the ABAQUS software and validated against the existing experimental results. With the developed numerical model, a parametric study including different influences on shear resistance of steel and composite girders should also be conducted. Those include variation of the: (a) aspect ratio, (b) web slenderness ratio, (c) heating rate, (d) number of shear studs and their distribution as well as (e) flange rigidity.
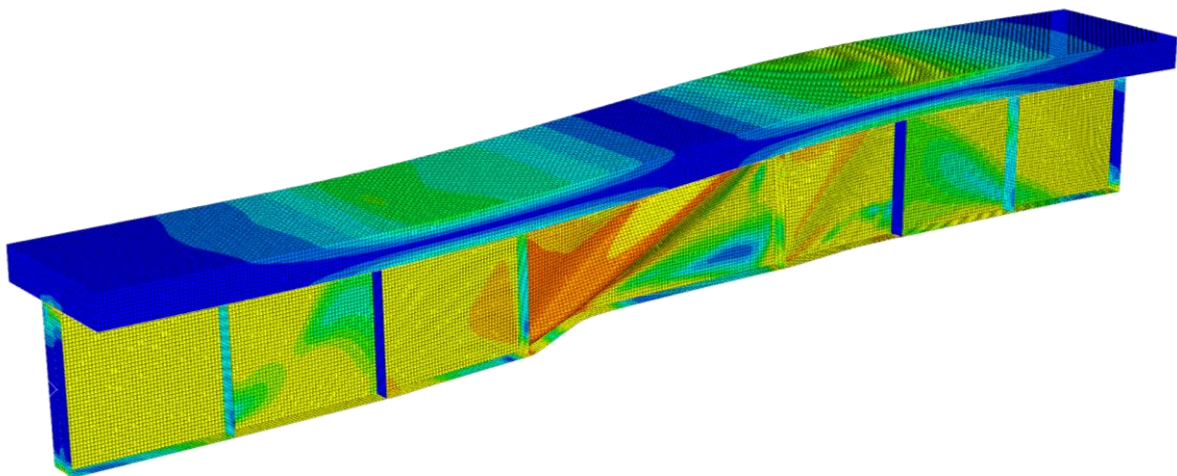

Fig. 1. Shear buckling of steel-concrete composite beam web using the Arc-Length Method

If you are interested in doing this master thesis in cooperation with our chair, please contact Mr. Numanovic (IC 5-83). Consultation hours are **Tuesdays and Wednesdays** from **13:00 to 14:00**.

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