CNSTH421 Structural Analysis and Finite Elements

Project assignment

Lab responsible:	P. Berke	2025-2026 academic year
Teaching assistants:	L. Remes and N. Mertens	

Suspension springs are essential for supporting the combined weight of the bike and the rider, absorbing bumps, and maintaining tyre contact with the road. Working together with the damping system, they control how the suspension compresses and rebounds, ensuring both comfort and stability. Evaluating the **spring stiffness** is key to analysing the suspension as a spring–mass–damper system, where the bike and rider's mass interact with the springs and dampers.

Figure 1: Kawasaki ZR-7 1999

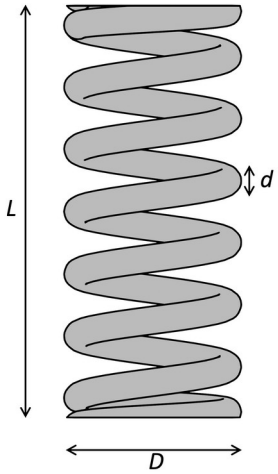

Figure 2: General spring geometry and dimensions

In a 1999 Kawasaki ZR-7 (*Figure 1*), the suspension uses three coil springs: two in the front forks and one at the rear, linking the chassis to the front and rear wheels, respectively The general spring geometry is shown in Fig. 2.

The front fork springs have dimensions L = 416 mm, D = 34 mm, d = 4,7 mm, n = 26 [-], where L is the free length, D is the outer coil diameter, d is the wire (cross-sectional) diameter of the spring and n is the number of coils. To validate your finite element model with respect to real life data, the stiffness of a front spring has been experimentally measured and found to be 7.2 kN/m.

Your task is to compute the axial stiffness of the rear spring that will be provided in the course of the project. You will have to take your own measurements on the provided part and deduce a FEM from it.