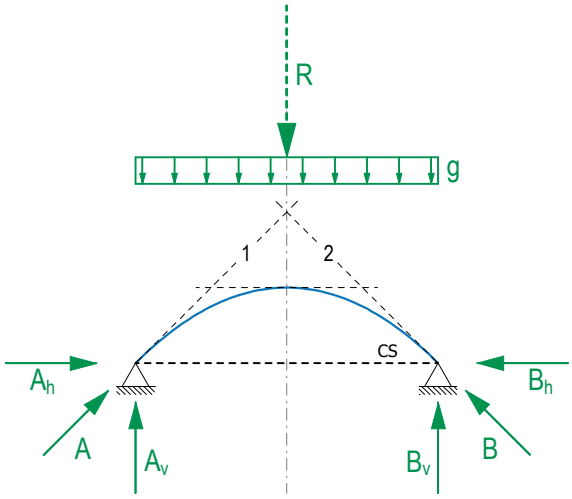
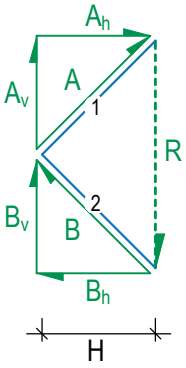
5.2

Arch-Cable Structures

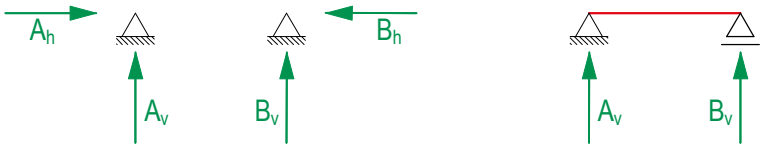
In the following, a simple arch structure, which transfers a constant line load into the two fixed supports A and B is analysed. The reaction forces can be divided into their horizontal and vertical components. A_h and B_h absorb the horizontal thrust caused by the arch, depending on its height.



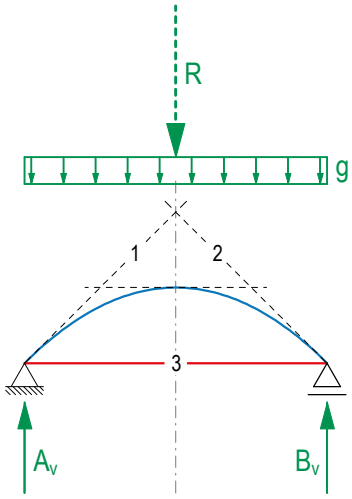
g = 7.5kN/m



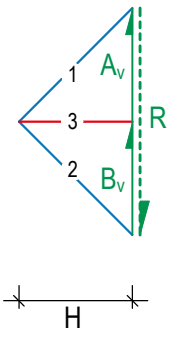
Often, however, a roller, which can only absorb vertical forces is used in a structure. Therefore the horizontal thrust must be absorbed within the structure. For this purpose a tension element is inserted between the two supports. Thus both reaction forces become vertical.



Instead of a horizontal reaction force acting on the system from the outside, the internal force now pulls the arch together and prevents support B from „rolling away“ to the side. The force in the cable corresponds to the horizontal components of the reaction forces. The combination of a compression-stressed arch and a tension-stressed cable is called arch-cable structure.



g = 7.5kN/m



form diagrams 1:100

force diagrams 1cm ≙ 10kN