METHODS OF APPROXIMATE STATIC ANALYSES OF COMPLEX STRUCTURAL SYSTEMS

JANUSZ RĘBIELAK[*]

[*] The Tadeusz Kosciuszko Cracow University of Technology
Ul. Warszawska 24, 31-155 Kraków, Poland
E-mail: j.rebielak@wp.pl,   URL: http://januszrebielak.pl

Key words: Static Analysis, Truss Structure, Frame Structure, Static Indeterminate System.

ABSTRACT

The proposed Minisymposium is aimed as a forum for the presentation of various recently developed methods of the force calculations acting in members of the complex shape structures, which are e.g. usually multiple statically indeterminate systems, where the force distribution between their component parts depends on numerous factors including ratio of stiffness of members creating them. The precise computing process of a statically indeterminate structure requires the application of a suitable method for taking into account the numerous structural features of that system. The newly proposed methods should be relatively simple and they should apply the basic rights and rules of the theory of structures [1,2]. One of them is the two-stage method of static analyses of the statically indeterminate trusses [3]. The point of this method is to determine two schemes of simple statically determined trusses, which after superposition of their patterns will give in result a pattern of the initial, more complex form of the statically indeterminate truss. Each of the simple trusses has to be of the same clear span and the load forces of the half values have to be applied to nodes having the same position like in the basic truss. It means that for the quite precise evaluation of forces acting in members of the statically indeterminate trusses it is possible to use one of the methods applied for calculations of the statically determined trusses like, for instance, the method of Cremona or the method of Ritter. The Minisymposium is intended to present several other methods, which can be suitably adapted and then applied for the advanced computer aided static calculations, which can give approximately results, being very close to the real force values but obtained in a relatively very simple way.

REFERENCES

[1] E. Allen, W. Zalewski and Boston Structures Group, *Form and Forces. Designing efficient, expressive structures*, John Wiley & Sons, Inc., Hoboken, New Jersey, 2010.

[2] T. Kolendowicz, *Mechanika budowli dla architektów*, Arkady, Warszawa, 1993.

[3] J. Rębielak, "A method of static calculation and shape of structural system developed by application of principles of superposition", *Lightweight structures in civil engineering – contemporary problems*, Local seminar of IASS Polish Chapter, pp. 155-158, (2012).