

Notices

1. The PDF file named as “a complete set of Assur groups with 2-12 links” is formed by the all synthesized Assur groups with 2, 4, 6, 8, 10 and 12 links derived from the study “Structural synthesis of Assur groups with up to 12 links and creation of their classified databases”, written by Peng Huang and Huafeng Ding.
2. In the PDF file, alphabetic letters are adopted to represent multidigit numbers: A represents 10, B represents 11, C represents 12, etc.
3. In the PDF file, the synthesized Assur groups are listed according to the link assortment arrays of corresponding Baranov trusses and the link assortment arrays are simplified as a string listed in “[]” as follows:
 - a) The first two characters are represented as the number of links and degrees of freedom of Baranov trusses, respectively.
 - b) The rest characters, in which two characters are divided into a groups in order, are represented as the number and the corresponding classification of ternary links, quaternary links, etc.

For example, the second link assortment array of 7-link Baranov trusses (for synthesizing the corresponding 6-link Assur groups) is simplified as [701423]. The first characters “70” are represented as the number of links and degrees of freedom of Baranov trusses are “7” and “0”, respectively. The rest characters “1423” are divided into two groups: the first group “14” is represented as the number of “quaternary links” is “1”; the second groups “23” is represented as the number of “ternary links” is “2”.

4. In order to reduce memory space and improve convenience of application for the synthesized Assur groups, all synthesized Assur groups derived from a same Baranov truss are saved in a shared code, called the stored code (SC). The SC of Assur groups derived from a same Baranov truss contains two parts and is obtained as follows:
 - a) The first part is the simplified characteristic code of the corresponding Baranov truss.
 - b) The second part is the equivalent code of all links of the corresponding Baranov truss.

The simplified characteristic code of a Baranov truss is referred in Refs. [1, 2]. And the code can uniquely represent the structure of the Baranov truss.

For the Baranov truss represented by its simplified characteristic code, the labels of the symmetric links (i.e. links x , y and z) are collected and listed in a string, denoted as “(xyz)” and the string is called the equivalent code of the links. The symmetry of all links is obtained from Sections 3.1 and 3.2 of the study “Structural synthesis of Assur groups with up to 12 links and creation of their classified databases”.

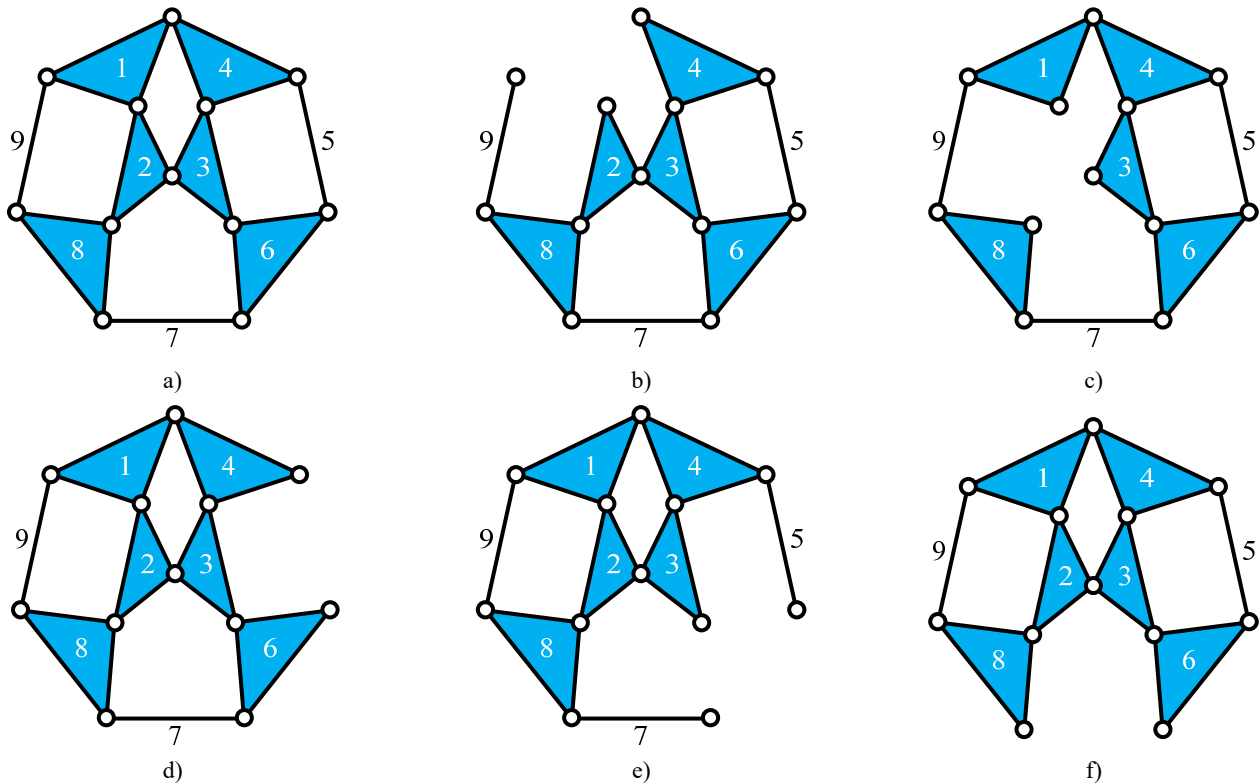


Fig. 1 a) a 9-link Baranov truss; b)-f) the corresponding 8-link Assur groups

For example, the simplified characteristic code of the given Baranov truss in Fig. 1a) is 9142836. Moreover, four couples of links in the given 9-link Baranov truss (links 1 and 4, links 2 and 3, links 5 and 9, and links 6 and 8) are symmetric, while link 7 has no symmetry, so the equivalent code of all links is written as (14)(23)(59)(68)(7). Consequently, the SC of the Assur groups derived from the Baranov truss is 9142836-(14)(23)(59)(68)(7).

5. All synthesized Assur groups saved in the PDF by using their stored codes (SCs).

References

- [1] H.F. Ding, P. Huang, W.J. Yang, A. Kecskeméthy. Automatic generation of the complete set of planar kinematic chains with up to six independent loops and up to 19 links. *Mechanism and Machine Theory*, 2016, 96:75-93.
- [2] P. Huang, H.F. Ding, Structural synthesis of Baranov trusses with up to 13 links. *ASME Journal of Mechanical Design*, 2019, 141:072301(1)-072301(16).