



## PLANETARY TRANSMISSIONS WITH PERIODICALLY VARIABLE GEAR RATIO

Ivan BALASHEV<sup>1</sup>, Silviu MACUTA<sup>2</sup>,

<sup>1</sup> Technical University of Gabrovo, BULGARIA,  
<sup>2</sup> "Dunarea de jos" University of Galati, ROMANIA  
Silviu.Macuta@ugal.ro

### ABSTRACT

*The paper presents ten mechanical diagrams of planetary transmissions with periodically variable gear ratio. Structural symbols are introduced and analytical dependence for determination of the gear ratio of these planetary transmissions. The gear ratio change depending on the drive shaft rotation angle is shown graphically.*

**Keywords:** planetary transmissions, periodically variable gear ratio

### 1. INTRODUCTION

The single-guide planetary transmission 2 has three shafts going out of the transmission. The size of the rotative moments, acting on the shafts (without considering the energy losses) are in certain ratio, notwithstanding which one is static (transmission with one degree of freedom) or the transmission works as a differential (two degrees of freedom). It will be more convenient for the theoretical investigations of planetary transmissions to use the structural symbols proposed by [1], for planetary transmission 2 (Fig. 1) and for planetary transmission with gear cluster (Fig. 2).

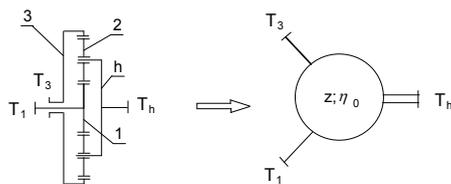


Fig. 1. Structural symbol of the planetary transmission 2

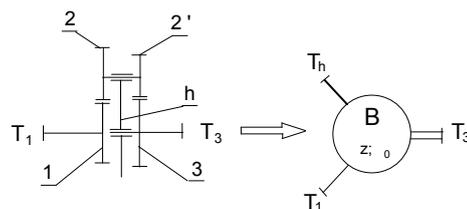


Fig. 2. Structural symbol of the planetary transmission 2 –B with gear cluster

The obtaining of planetary transmissions with periodically variable gear ratio 2, shaft 1 and 3 (Fig. 1) are connected with closed kinematic chain (link flat gear [2]), for which structural symbols are introduced, shown on Figures 3 and 4, depending on the

mechanical diagram. The hinged four-link network is also used. The structural symbol of VG hinged four-link network is shown in Fig. 5.

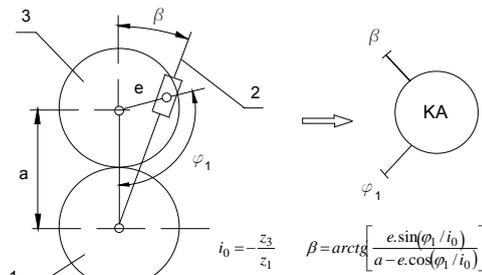


Fig. 3. Structural symbol of flat link gear version K

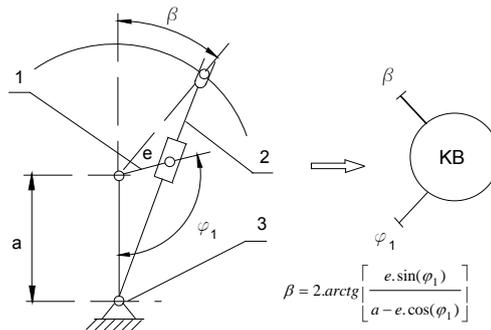


Fig. 4. Structural symbol of flat link gear version

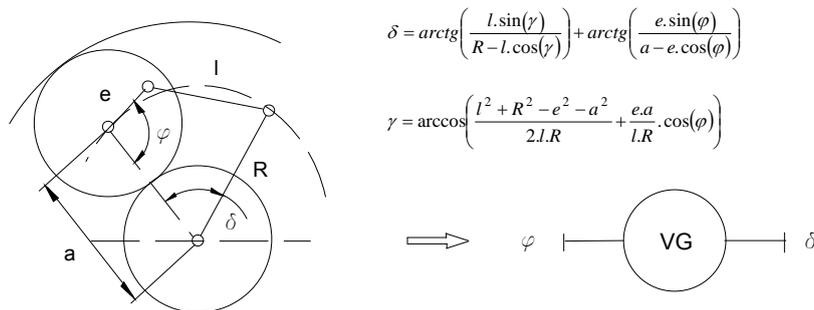


Fig. 5. Structural symbol of VG hinged four-link network

## 2. TECHNICAL REQUIREMENTS

Flat leverages, symbols and markings are introduced for creation of planetary transmissions with periodically variable gear ratio. Dependencies have been shown for the rotation angle, the angular speed, the driven shaft acceleration and the gear ratio of the planetary transmissions with periodically variable gear ratio [2]. On the basis of these dependencies, computer programs for graphical presentation have been done. The mechanical diagrams, the structural symbols, the marking, the analytical dependence and the gear ratio graphical expression are shown on the following figures [1].

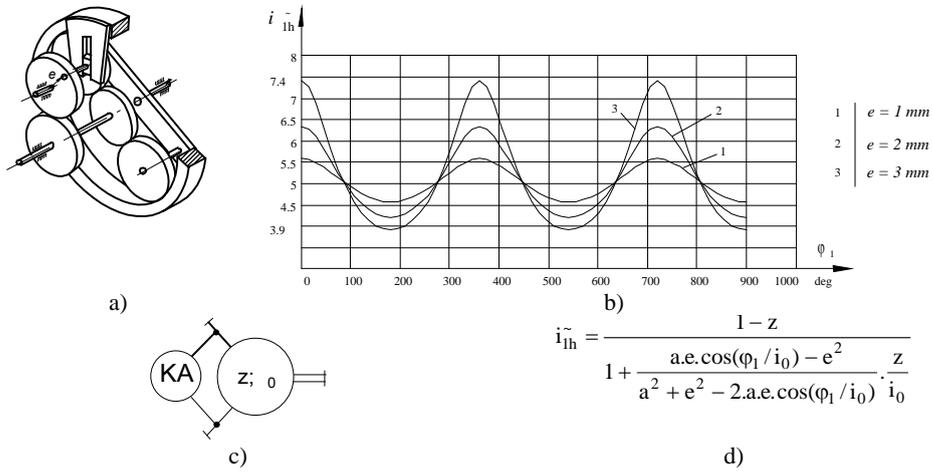


Fig. 6. Planetary transmission 2 -

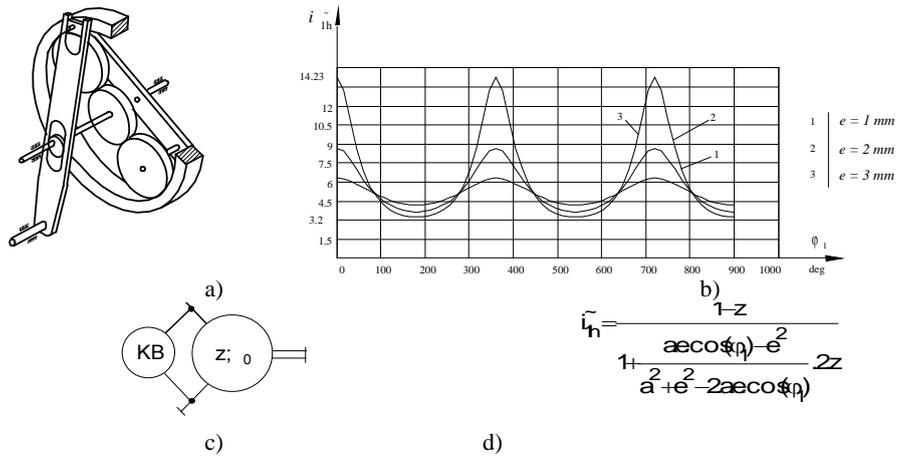


Fig. 7. Planetary transmission 2 -

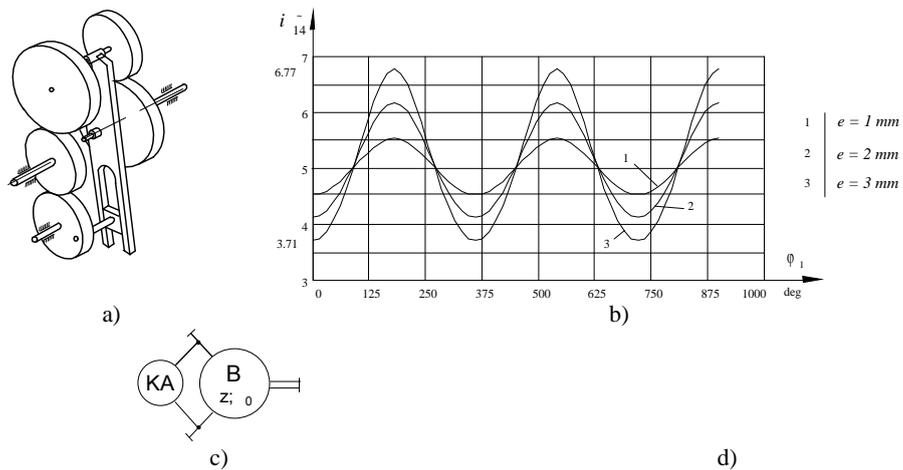


Fig. 8. Planetary transmission 2KH-B-KA

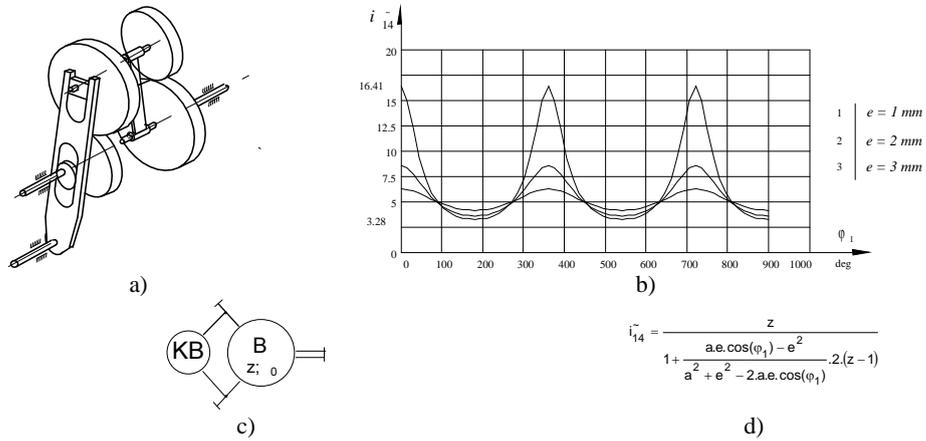


Fig. 9 Planetary transmission 2KH-B-K

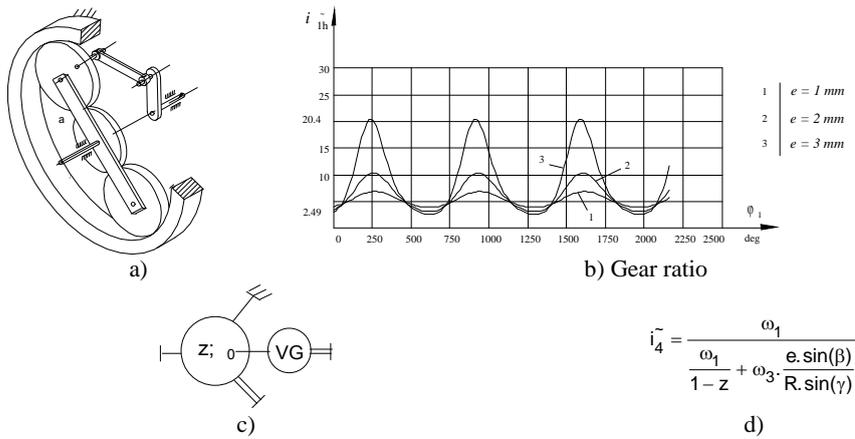


Fig. 10. Planetary transmission 2 -VG

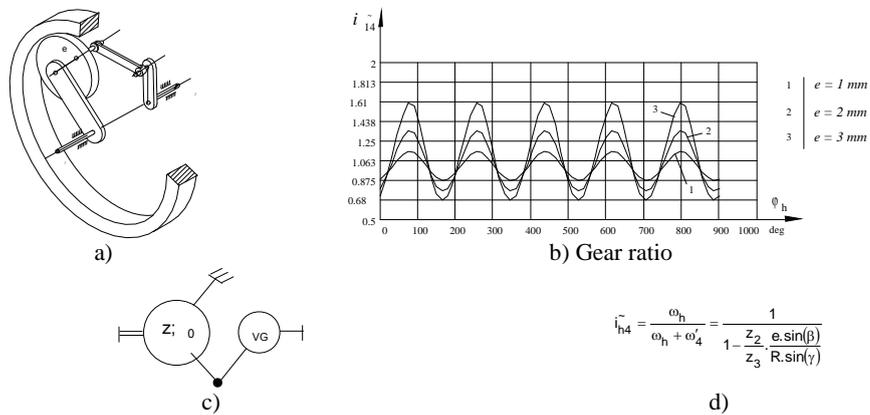


Fig. 11. Planetary transmission KH-VG-A

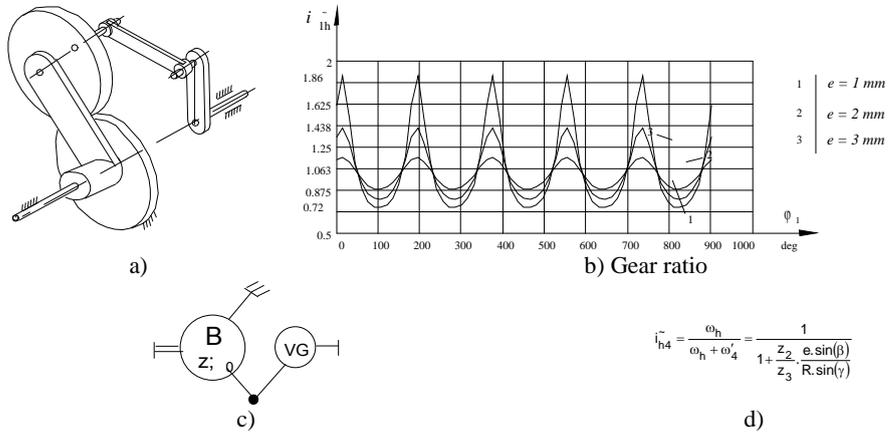


Fig. 12. Planetary transmission KH-VG-B

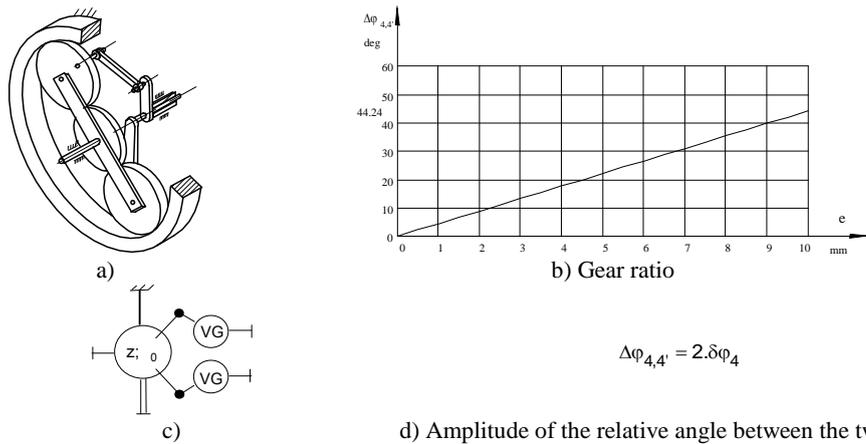


Fig. 13. Planetary transmission 2KH-2VG

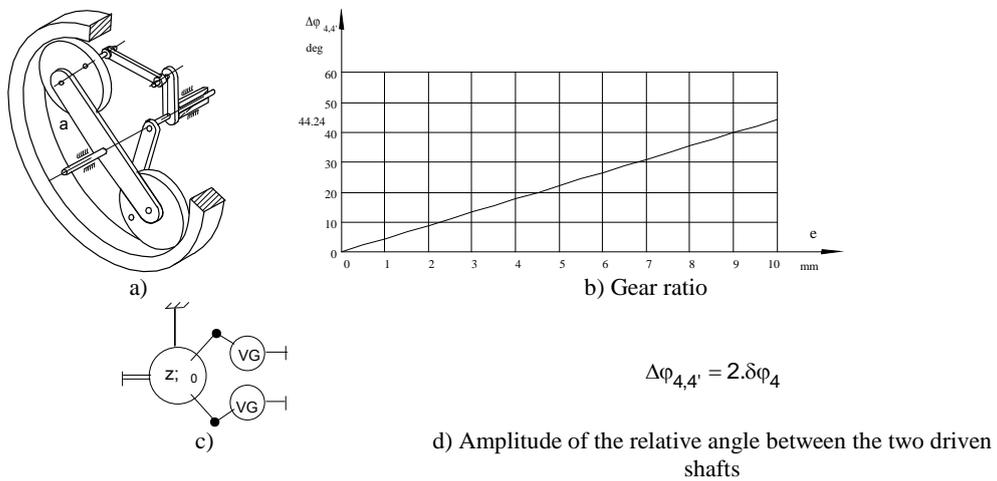


Fig. 14. Planetary transmission KH-2VG-A

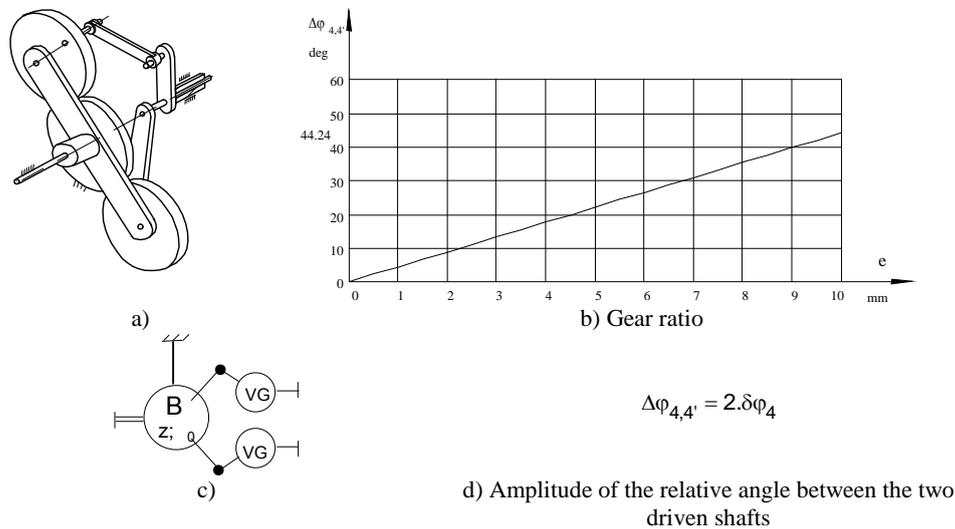


Fig. 15. Planetary transmission KH-2VG-B

### 3. CONCLUSIONS

Ten new mechanical diagrams of the planetary transmissions with periodically variable gear ratio have been created, for which the structural symbols have been adapted. The mechanical analysis has been done and the dependencies for determining the transmission gear ratio have been shown. The results have been graphically shown by a computer program [3].

### 4. REFERENCES

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