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Not Some Matters of Mutually Crossing Second Order Surfaces

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Abstract - In this paper, we consider the intersection line of two second-order surfaces having tangencies at two points that decompose into two second-order curves. Based on this property, it is possible to determine the position of the circle in front of a given shape on second-order surfaces of a general form.

Keywords - Second Order Surfaces, Matters Of Mutually

In engineering practice, second-order surfaces are widely used for the construction of parts of various mechanisms and design for the creation of elements of building structures. It is known that the order of the line of intersection of a surface is equal to the product of the orders of the surfaces. If we denote the intersecting surfaces by Φ1m ∩ Φ2n, then the lines of their intersection are $\phi_1^n \cap \Phi_2^m = l^{mn}$. Since the order of the line of intersection of the surfaces of the second order is equal to the product of the orders of the surfaces, this line is always a fourth-order curve. Unlike other fourth-order curves, it is often called a biquadratic curve.

Therefore, two Φ_1^2 and Φ_2^2 second-order rotation surfaces always intersect along a fourth-order curve or $\Phi_1^2 \cap \Phi_2^2 = l^4$. Since the surfaces of the second order are algebraic, their intersection line will be algebraic. Under certain conditions, this curve l splits into several lines of lower orders. Moreover, the sum of the orders of the lines into which the algebraic curve splits is equal to the order of the line itself. Symbolically, these cases can be written as follows:

1).4 =1+ 1 + 1 + 1; 2). 4 = 2 + 2; 3) .4 = 2 + 1 + 1; 4) .4 = 3 + 1.

The first means that the fourth-order curve has split into four straight lines, which are first-order lines. For example, the surfaces of two second-order cylinders with parallel axes, as well as two second-order conical surfaces having a common vertex and intersecting the bases.

But the second case is especially important when, the decay of the fourth-order curve into two second-order curves. In the third case, a fourth-order curve dissolves on one second-order curve and two first-order curves. In the fourth case, a fourth-order curve decays into a third-order curve and one first-order curve. It should be borne in mind that some lines into which the curve splits can be minimal.

The condition under which a fourth-order curve splits into two second-order curves is formulated by the following theorems:

Theorem 1. If two surfaces of the second order intersect in one plane curve, then they intersect in another plane curve.

As a visual illustration of this theorem, Figure 1 shows the frontal projections l''_1 and l''_2 of second-order curves (in particular circles) obtained by intersecting the surfaces of a sphere $\Phi^2{}_2$ and a circular cylinder $\Phi^2{}_1$.

Theorem 2. If two surfaces of the second order have a tangency at two points, along the line of their intersection it splits into two curves of the second order, the planes of which pass through a straight line connecting the points of contact.

Figure 2 shows the intersection of the conical Φ_1 (Φ'_1, Φ''_1) and cylindrical Φ_2 ($\Phi_2{}'$, $\Phi_2{}''$) surfaces of the second order. Surfaces Φ_1 and Φ_2 have two common tangent planes Γ (Γ_H, Γ_V) and Γ_1 (Γ_{1H}, Γ_{1V}), respectively, two common tangent points A (A ', A '') and B (B', B''). Therefore, by Theorem 2, they intersect in two second-order curves located in the planes P (Pv) and Q (Qv). The planes Γ and Γ_1 pass through straight line AB (A'B', A''B''). Since the line AB is perpendicular to the projection plane V, the planes P and Q are frontally projecting. Therefore, the curves belonging to them are projected onto the plane V in the segment C'D'' and E'F'' belonging to the corresponding frontal traces of the planes Pv and Qv.

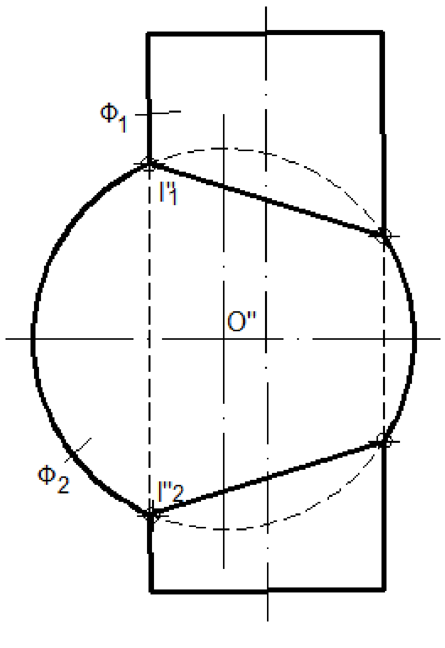

Figure 1

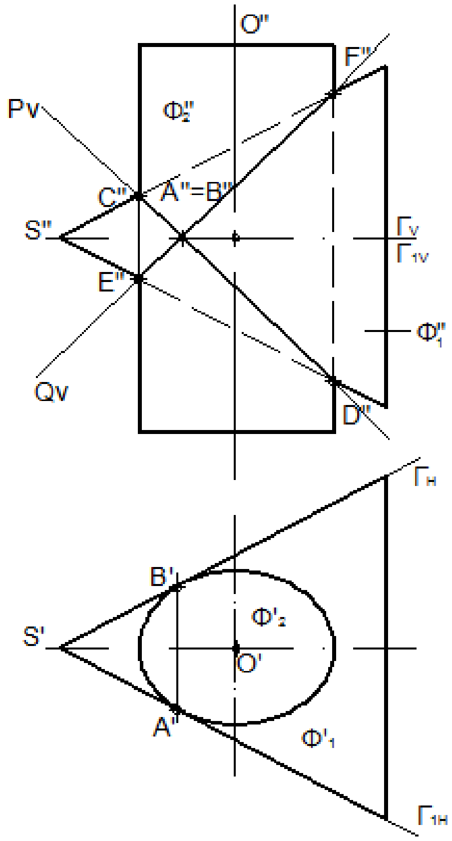

Figure 2

Theorem 2 can be used to solve the problem of determining the position of planes intersecting second-order surfaces of the general form, whose normal sections are ellipses along the predetermined radius of the circle.

Theorem 3. If two surfaces of the second order are described near the third surface of the second order or inscribed more, then the line of their intersection splits into two curves of the second order, the planes of which pass through the straight line connecting the intersection points of the tangent lines.

The practical use of the theorem is possible in the case when two surfaces of revolution of the second order can be described near the sphere or inscribed in it. This theorem is called in some textbooks the theorem of Gospard Monge (1746-1818), a prominent mathematics doctrine academician of the French Academy, who is basically the proponent of descriptive geometry and wrote the first textbook in 1795 on this discipline,

Figure 3 gives an idea of how to determine the intersection lines of two conical surfaces Φ_1"and Φ_2" described near the sphere Φ_3". The surface Φ_1" is in contact with the sphere Φ_3"in a circle whose frontal projection is C" D ". The surface Φ2" is in contact with the spheres Φ_3"in a circle, the frontal projection of which is E" F".The point of intersection of these circles A" and B "are the points of contact of the surfaces Φ_1" and Φ_2 ".

By theorem, the plane of the curves must pass through the line AB. Since AB ⊥ V, the planes Qv and Pv are frontally projecting, and the projections of the curves are projected into segments C "D" and E "F".

The conical surfaces Φ1 and Φ2 shown in Fig. 3 intersect along two curves, one of which is C "D" - an ellipse, the other is E "F'-parabola, which are the conical folds of the second cone.

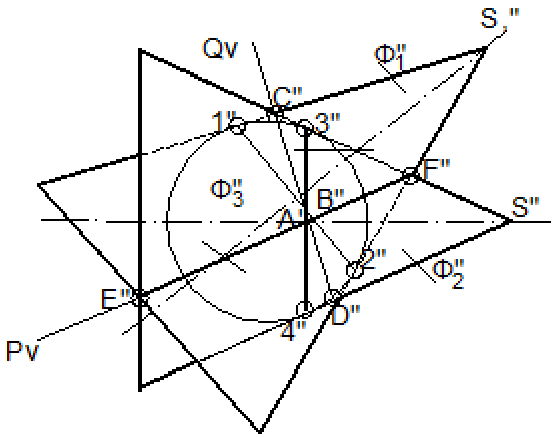

Figure 3

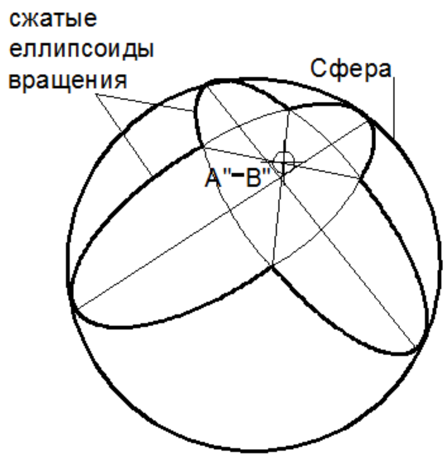

Figure 4

Monge's theorem rearranges a special case of the double-touch theorem. Indeed, let the tangent lines, as lying on the third surface and being flat, intersect at the real points A and B. Then it is obvious that the tangent plane at point A will simultaneously touch the first and second surfaces. Therefore, point A will be the point of contact for the given surfaces. Same point B. Therefore, there is a double touch, and therefore, on the basis of a theorem relating to this case, these surfaces intersect in a flat curve. In practice, Monge's theorem is often applied when second-order surfaces of revolution, described around a common sphere or inscribed in it, intersect - 4

References

[1] Bubenikov AV and Gromov M.Ya Nachertatelnaya geometryMoscva, "High School" 1973.

[2] Kuznetsov NS Nachertatelnaya geometry Moscow, "High School" 1973.

[3] Murodov.Sh.K и другие Drawing Geometry Tashkent "Economics and Finance" 2008