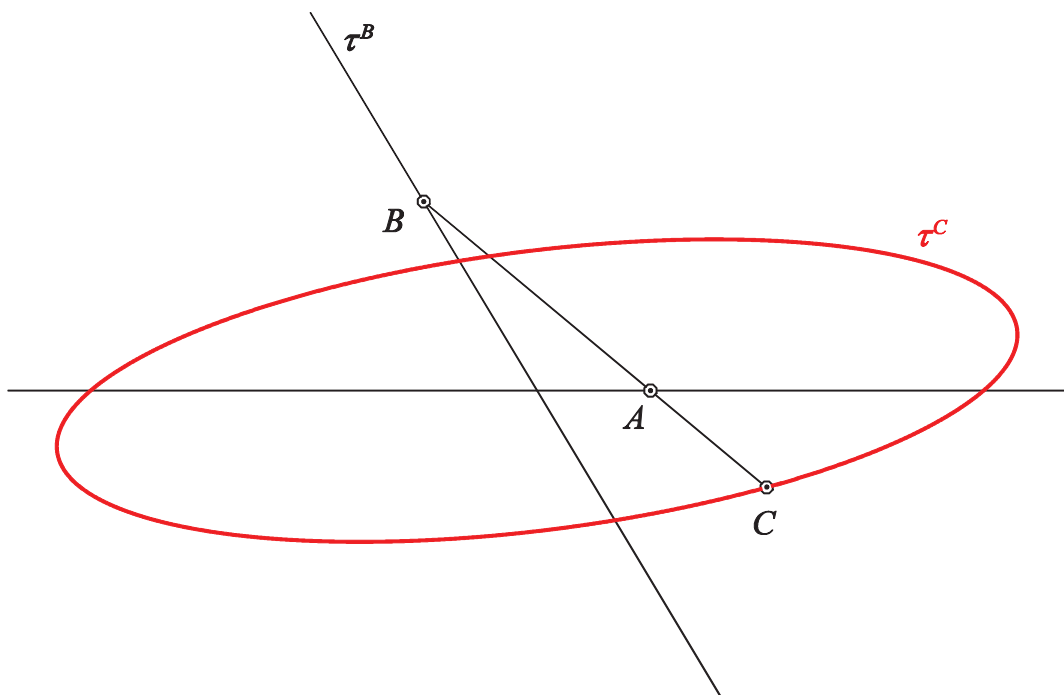
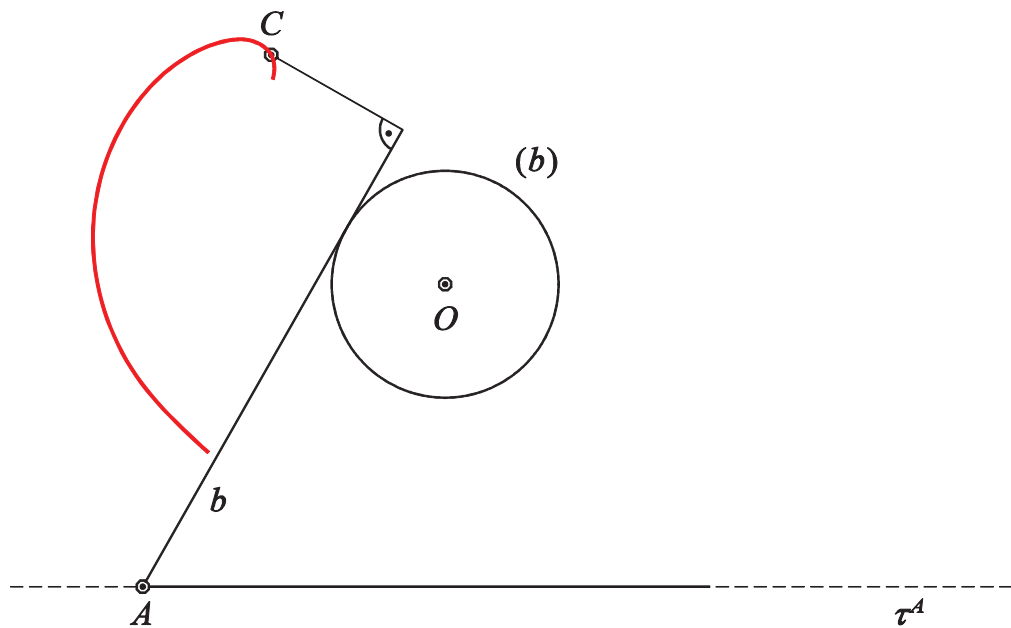
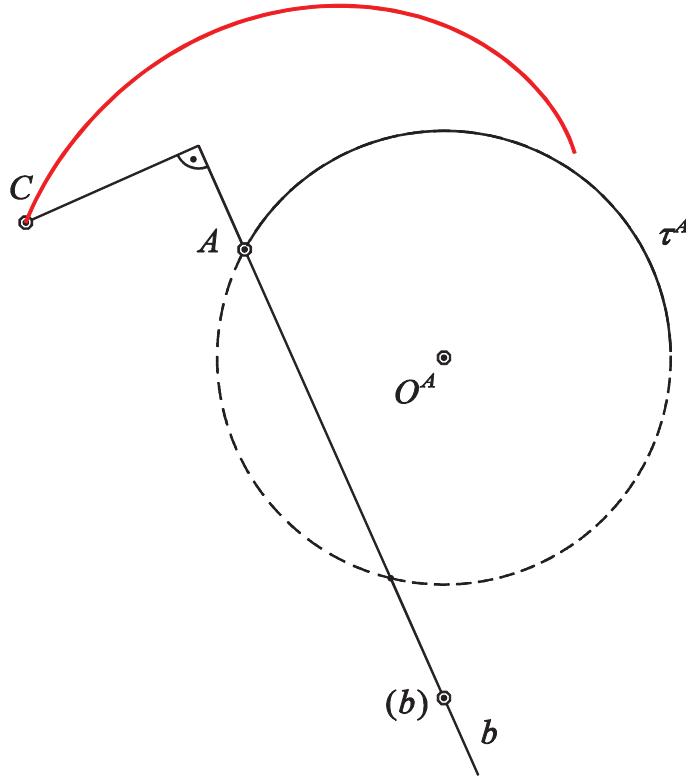


4. Planar kinematic geometry

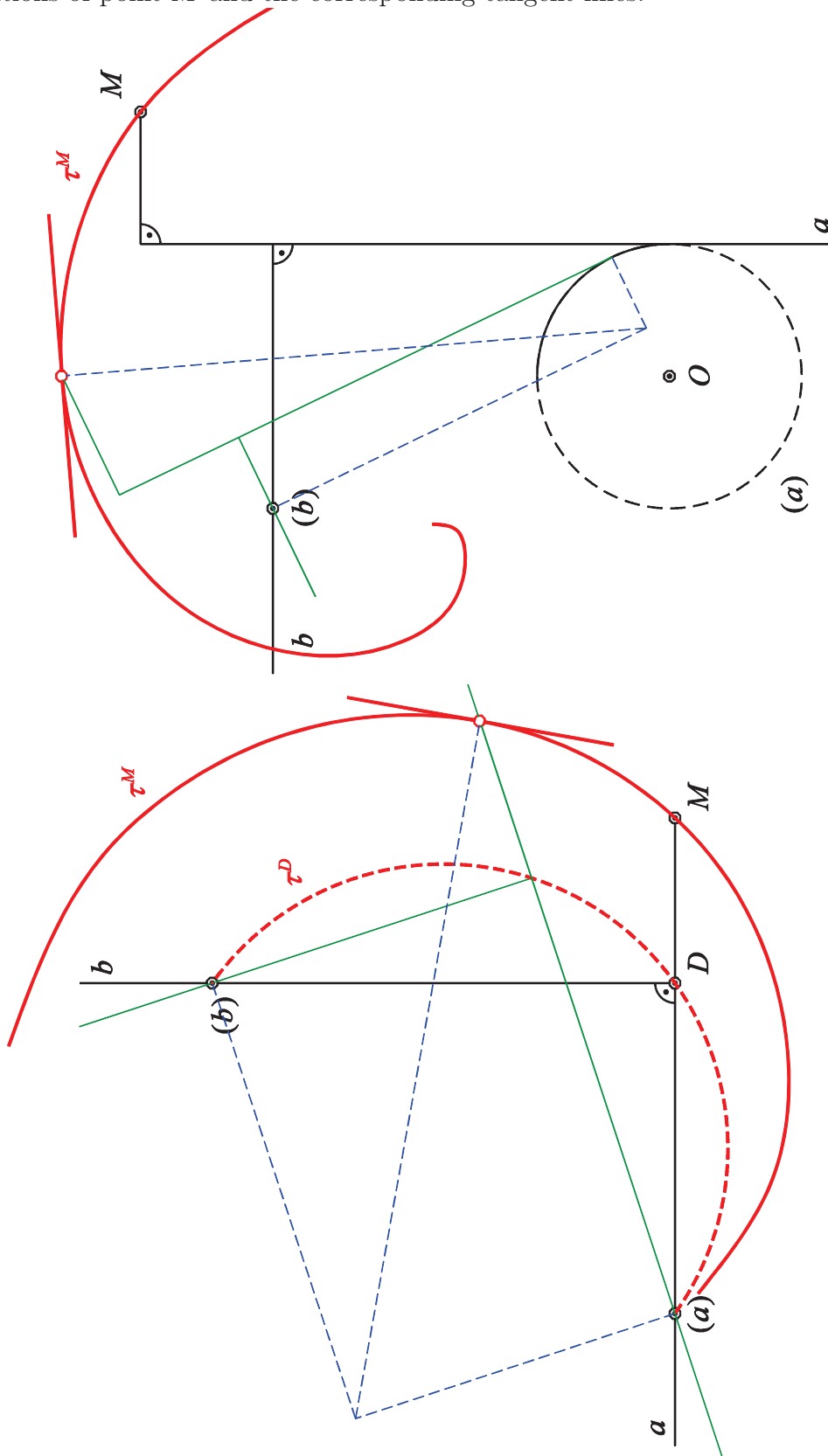
- 4.1. Motion is given by trajectory τ^A of point A and trajectory τ^B of point B . Construct at least three new positions of point C . Construct tangent lines to the trajectory τ^C at each position. Sketch the part of trajectory τ^C determined by all positions of point C and the corresponding tangent lines.



4.2. Motion is given by trajectory τ^A of point A and envelope (b) of straight line b . Construct at least three new positions of point C . Construct tangent lines to the trajectory τ^C at each position. Sketch the part of trajectory τ^C determined by all positions of point C and the corresponding tangent lines.



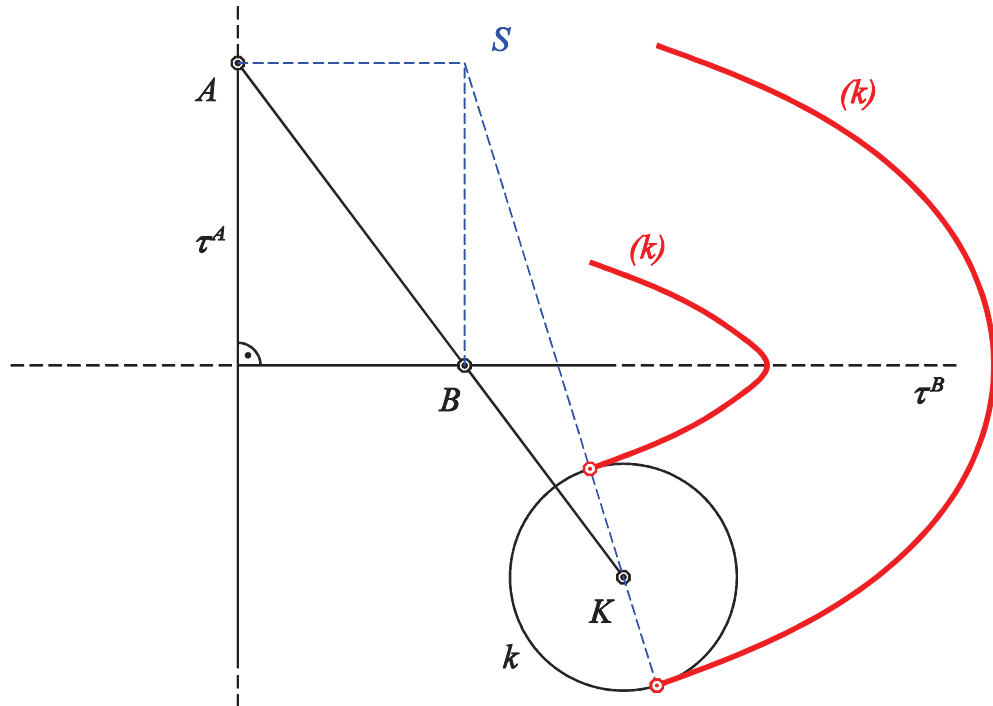
4.3. Motion is given by envelope (a) of straight line a and envelope (b) of straight line b . Construct at least three new positions of point M . Construct tangent lines to the trajectory τ^M at each position. Sketch the part of trajectory τ^M determined by all positions of point M and the corresponding tangent lines.



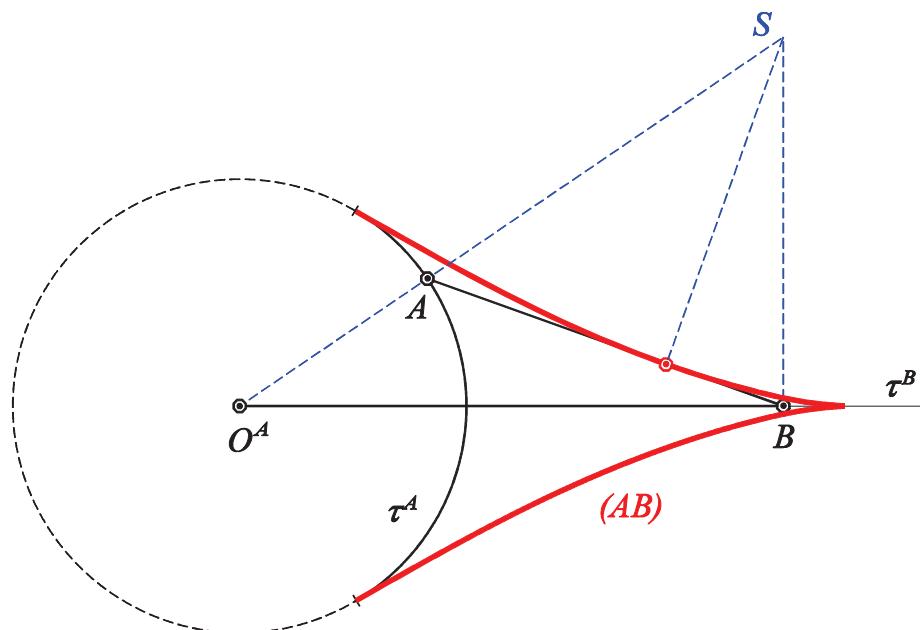
4.4. Motion is given by trajectory τ^A of point A and trajectory τ^B of point B . Consider the continuous part of both trajectories only.

- a) Construct at least three new positions of circle k . Construct point of contact between the circle and its envelope (k) at each position. Sketch the part of envelope (k) determined by all positions of circle k and the corresponding points of contact.
- b) Construct at least three new positions of straight line AB . Construct point of contact between the line and its envelope (AB) at each position. Sketch the part of envelope (AB) determined by all positions of straight line AB and the corresponding points of contact.

a)

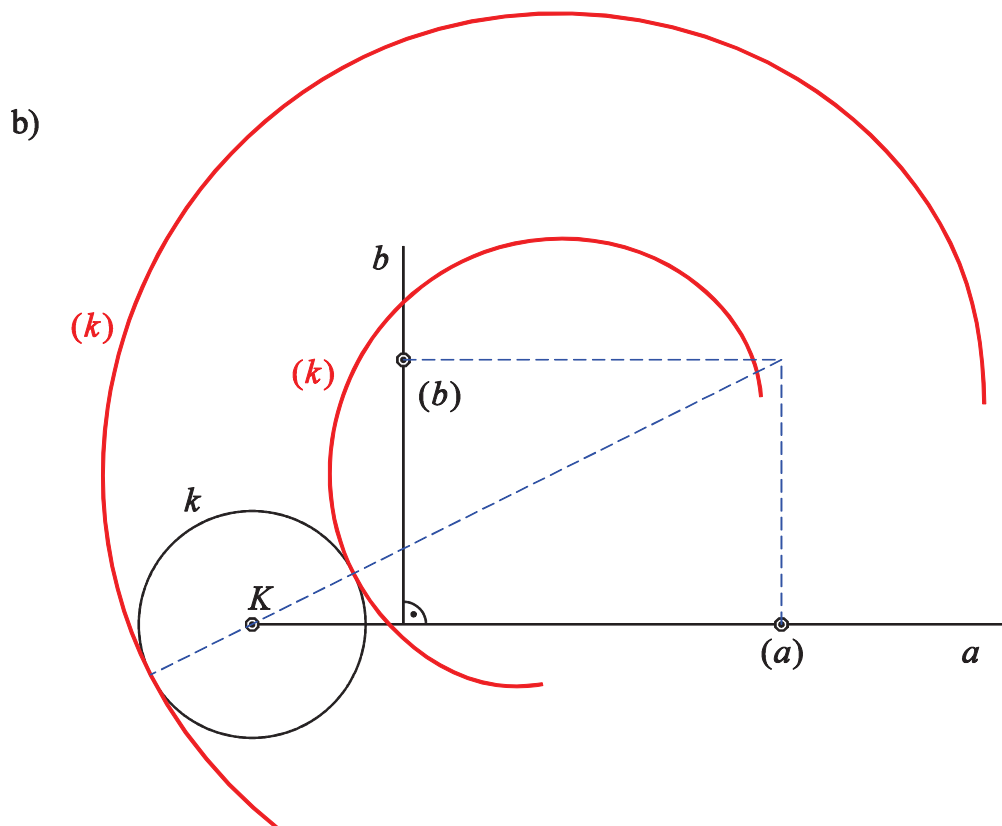
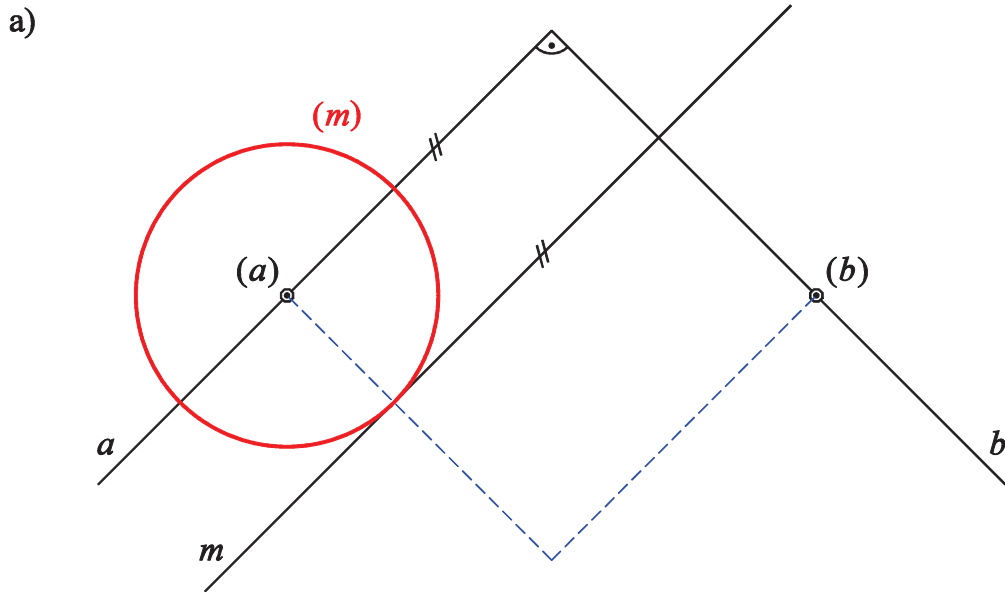


b)

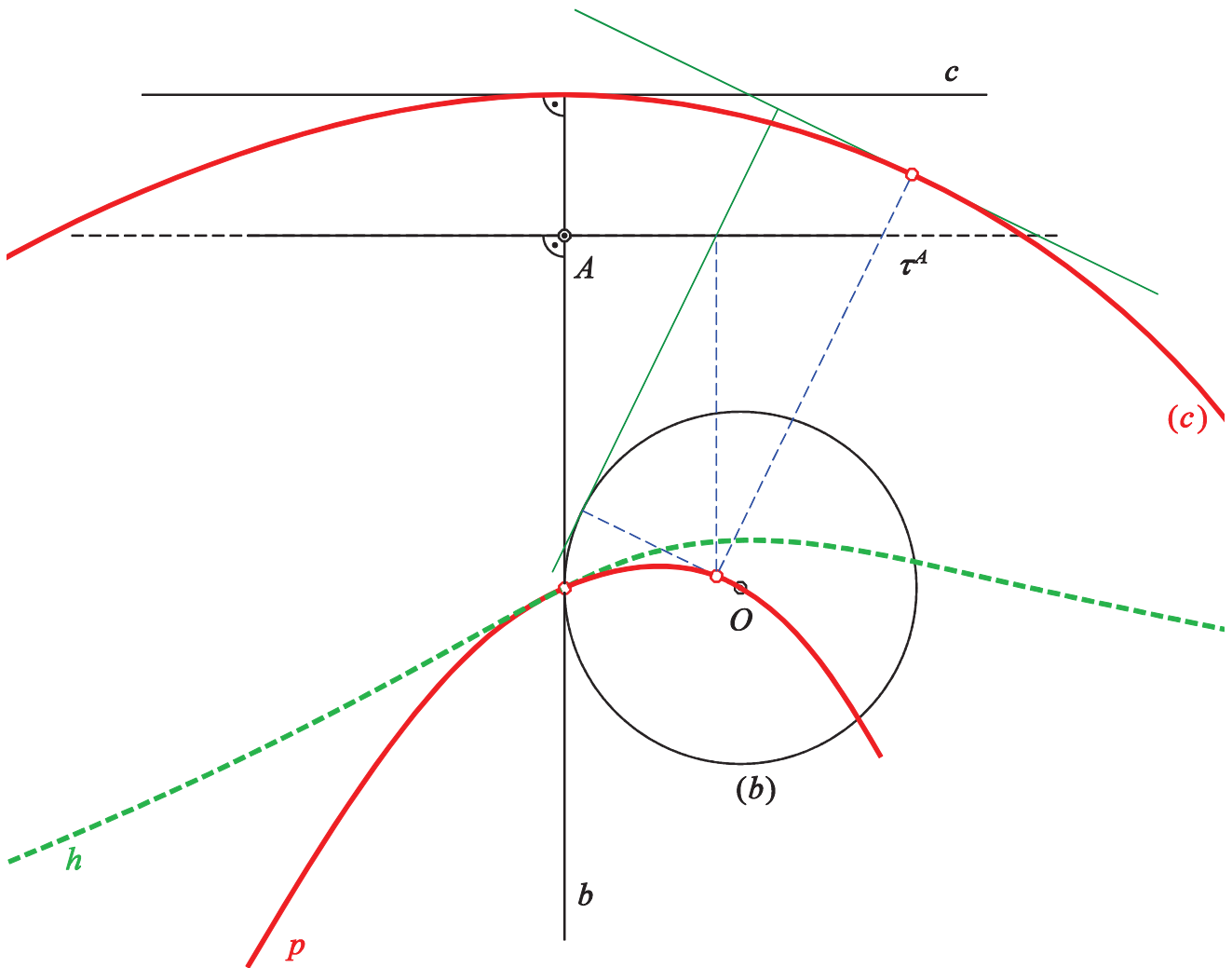


4.5. Motion is given by envelope (a) of straight line a and envelope (b) of straight line b .

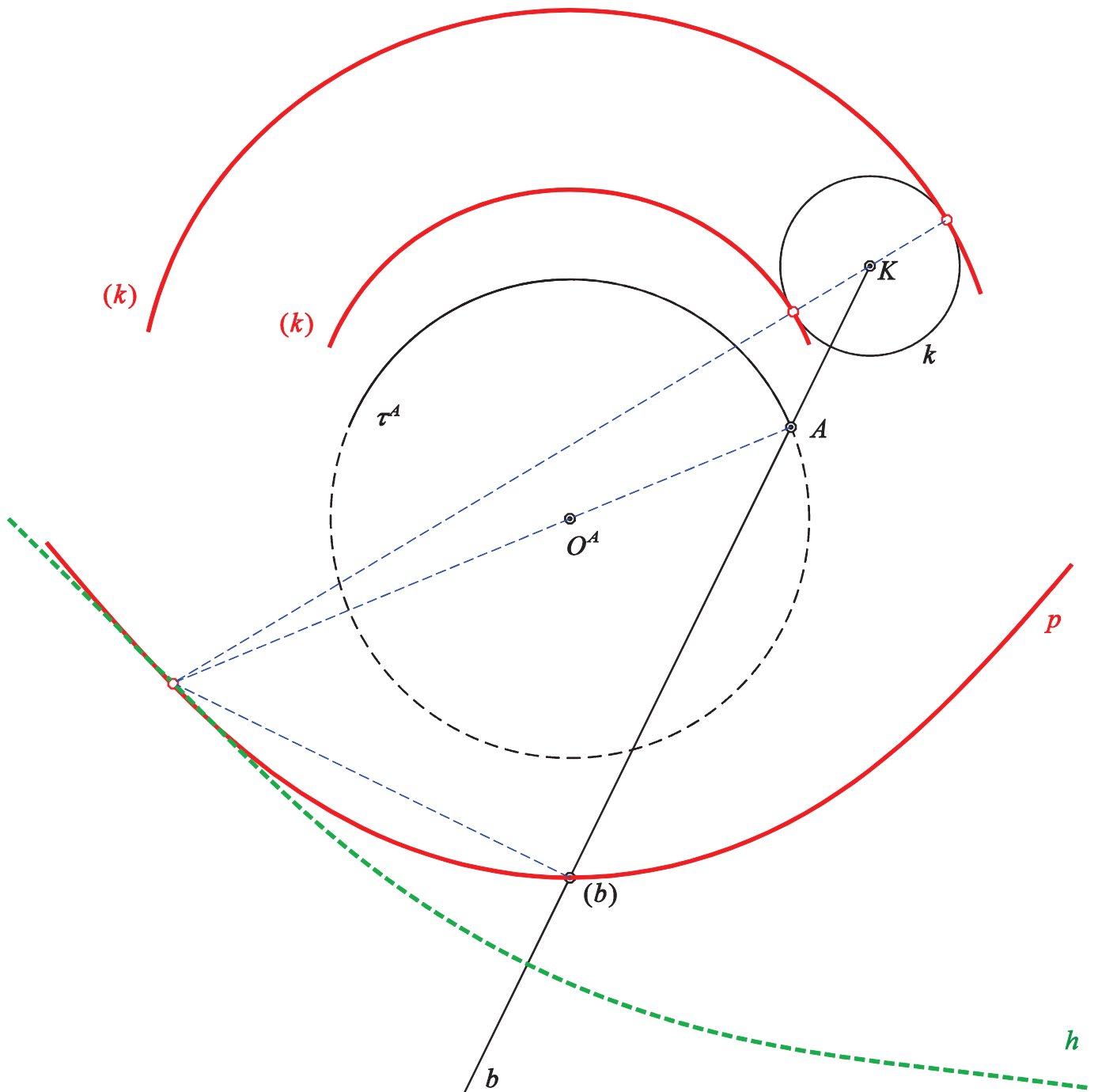
- a) Construct at least three new positions of straight line m . Construct point of contact between the line and its envelope (m) at each position. Sketch the part of envelope (m) determined by all positions of straight line m and the corresponding points of contact.
- b) Construct at least three new positions of circle k . Construct point of contact between the circle and its envelope (k) at each position. Sketch the part of envelope (k) determined by all positions of straight line m and the corresponding points of contact.



- 4.6. Motion is given by trajectory τ^A of point A and envelope (b) of straight line b . Consider the continuous parts of trajectory τ^A only.
- Construct at least three new positions of straight line c . Construct point of contact between the line and its envelope (c) at each position. Sketch the part of envelope (c) determined by all positions of straight line c and the corresponding points of contact.
 - Construct the corresponding part of fixed centrodre p
 - Construct the corresponding part of moving h^0 at the given instant.

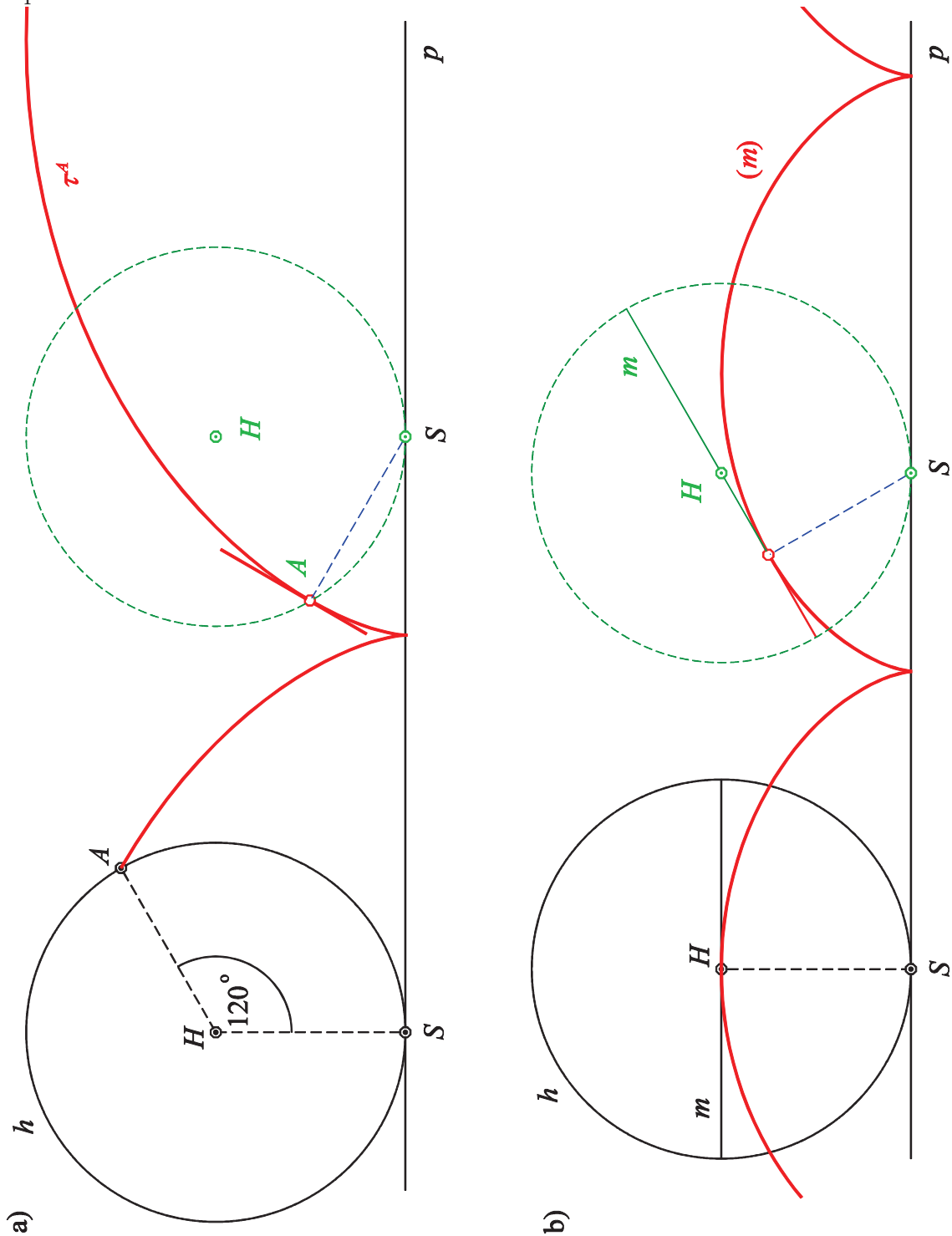


- 4.7. Motion is given by trajectory τ^A of point A and envelope (b) of straight line b . Consider the continuous part of trajectory τ^A only.
- Construct at least three new positions of circle k . Construct point of contact between the circle and its envelope (k) at each position. Sketch the part of envelope (k) determined by all positions of circle k and the corresponding points of contact.
 - Construct the corresponding part of fixed centrode p
 - Construct the corresponding part of moving h^0 at the given instant.

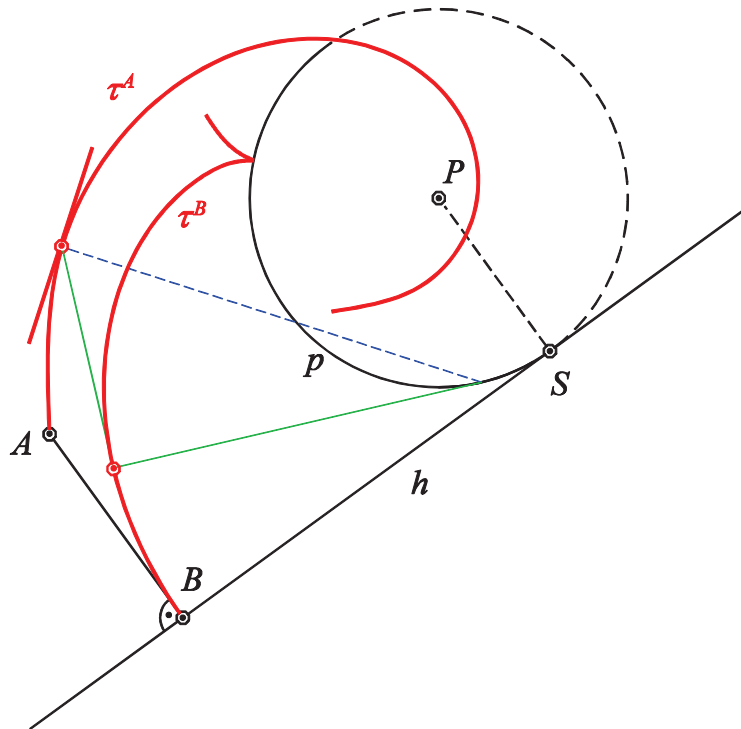


4.8. Motion is given by fixed centrode p and moving centrode h .

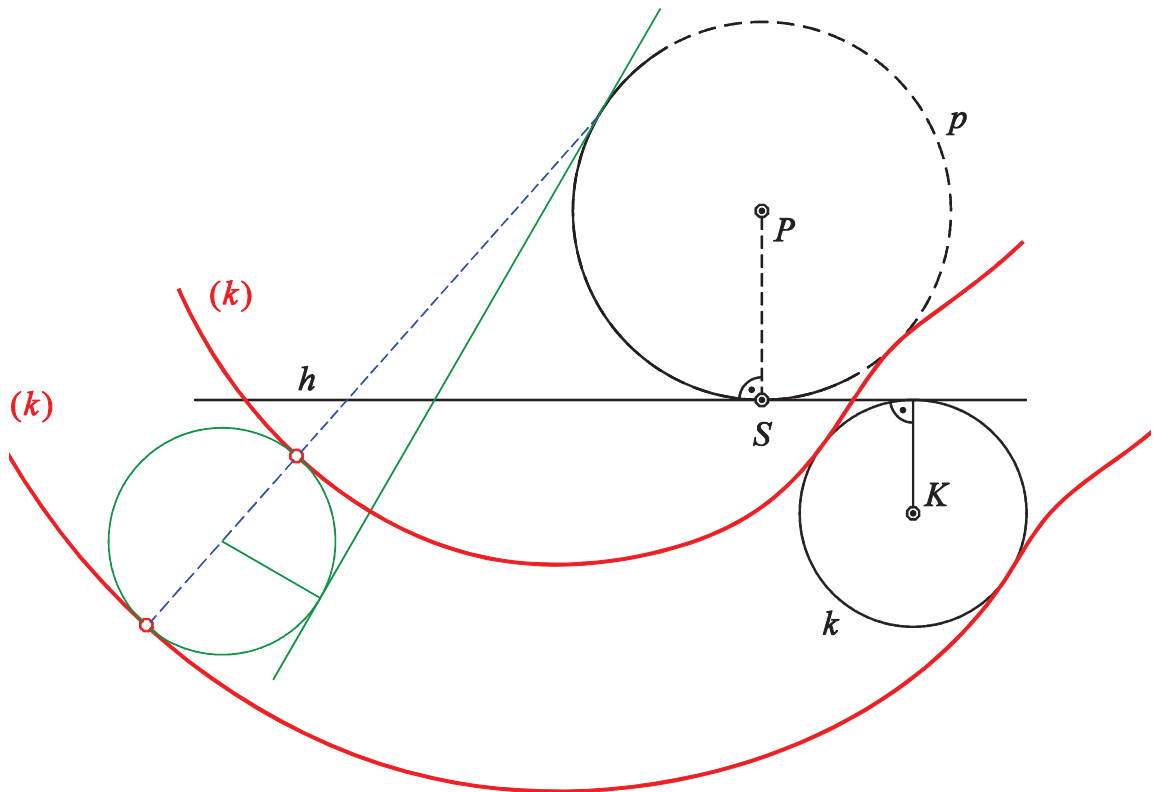
- a) Construct a sufficient number of new positions of point A . Construct tangent lines to the trajectory τ^A at each position. Sketch the part of trajectory τ^A determined by all positions of point A and the corresponding tangent lines. Construct vertex V and cuspidal point R of trajectory τ^A .
- b) Construct a sufficient number of new positions of straight line m . Construct point of contact between the line and its envelope (m) at each position. Sketch the part of envelope (m) determined by all positions of straight line m and the corresponding points of contact.



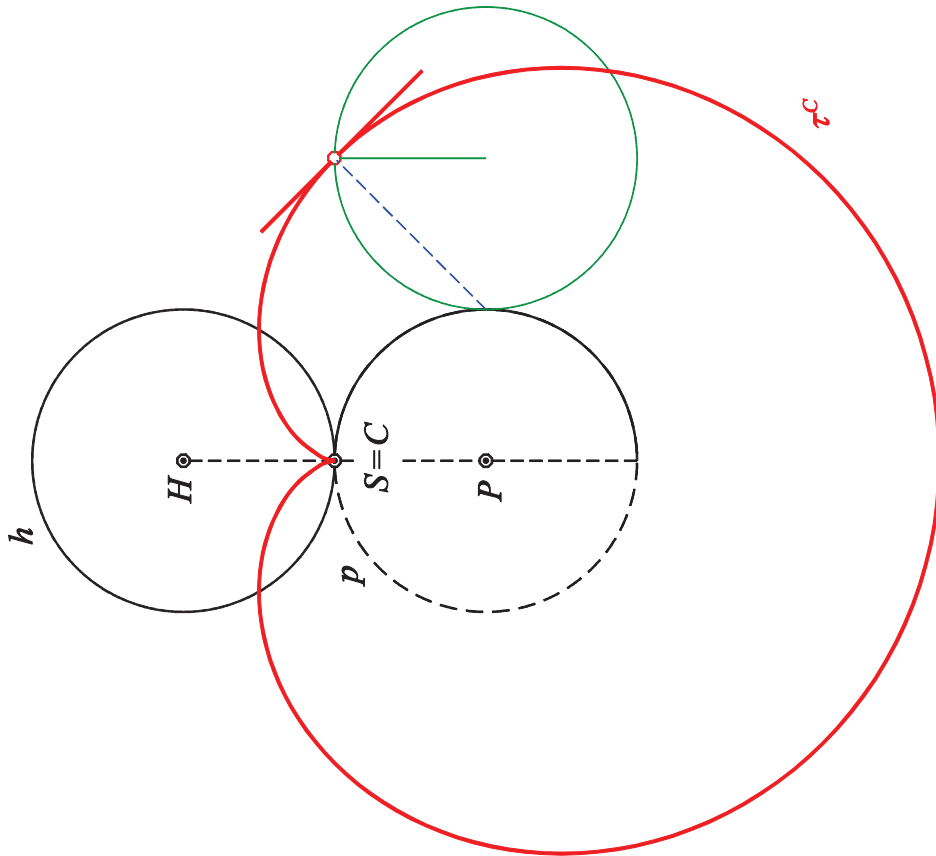
4.9. Motion is given by fixed centrode p and moving centrode h . Consider the continuous part of fixed centrode p only. Construct a sufficient number of new positions of points A and B . Construct tangent lines to the trajectories τ^A and τ^B at each position. Sketch the part of trajectories τ^A and τ^B determined by all positions of points A and B and the corresponding tangent lines.



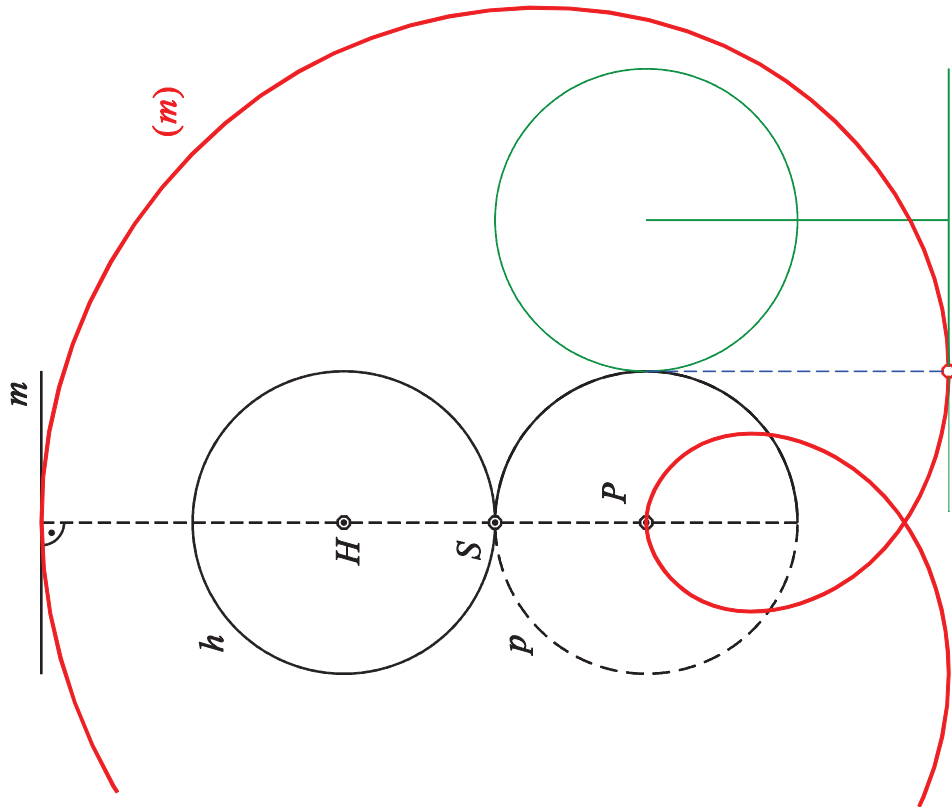
- 4.10. Motion is given by fixed centrode p and moving centrode h . Consider the continuous part of fixed centrode p only. Construct a sufficient number of new positions of circle k . Construct point of contact between the circle and its envelope (k) at each position. Sketch the part of envelope (k) determined by all positions of circle k and the corresponding points of contact.



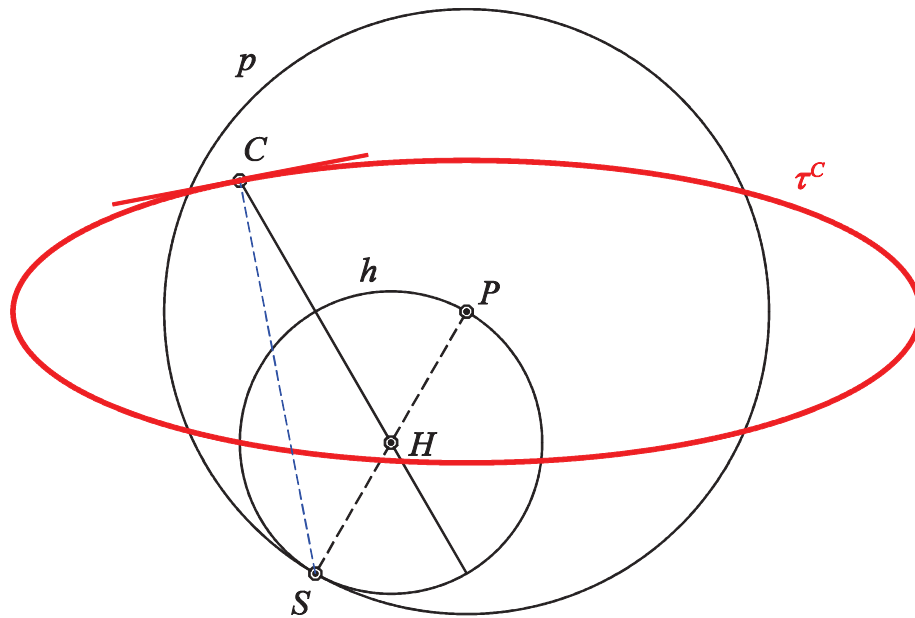
4.11. Motion is given by fixed centrode p and moving centrode h . Consider the continuous part of fixed centrode p only. Construct a sufficient number of new positions of point C . Construct tangent lines to the trajectory τ^C at each position. Sketch the part of trajectory τ^C determined by all positions of points C and the corresponding tangent lines.



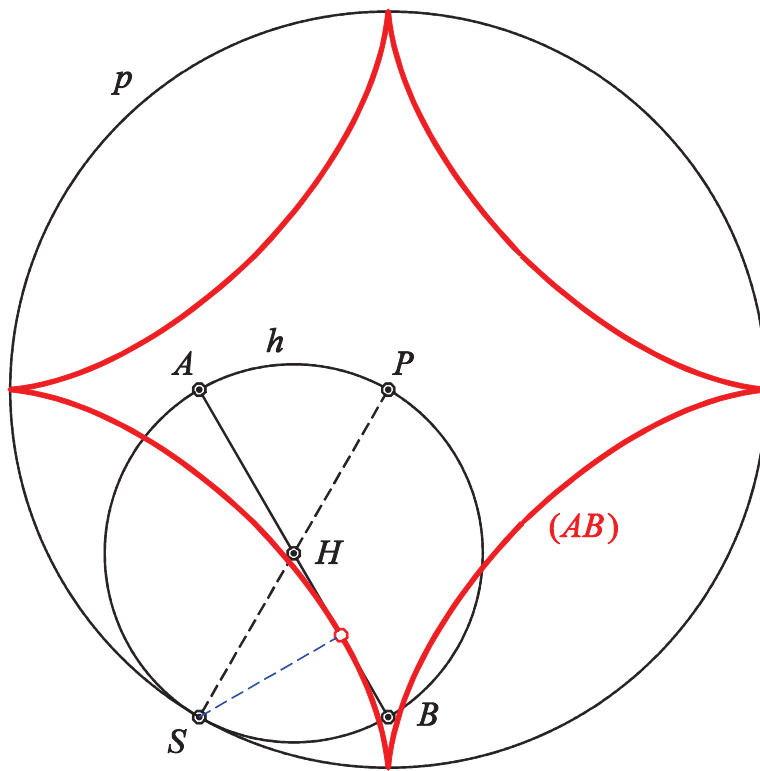
4.12. Motion is given by fixed centrode p and moving centrode h . Consider the continuous part of fixed centrode p only. Construct a sufficient number of new positions of straight line m . Construct point of contact between the line and its envelope (m) at each position. Sketch the part of envelope (m) determined by all positions of straight line m and the corresponding points of contact.



4.13. Motion is given by fixed centrode p and moving centrode h . Construct a sufficient number of new positions of point C . Construct tangent lines to the trajectory τ^C at each position. Sketch the part of trajectory τ^C determined by all positions of points C and the corresponding tangent lines.



- 4.14. Motion is given by fixed centrode p and moving centrode h . Construct a sufficient number of new positions of straight line AB . Construct point of contact between the line and its envelope (AB) at each position. Sketch the part of envelope (AB) determined by all positions of straight line AB and the corresponding points of contact.



4.15. Motion is given by fixed centrode p and moving centrode h . Consider the continuous part of fixed centrode p only. Construct a sufficient number of new positions of points A , B and C . Construct tangent lines to the trajectories τ^A , τ^B and τ^C at each position. Sketch the part of trajectories τ^A , τ^B and τ^C determined by all positions of points A , B and C and the corresponding tangent lines.

Solution scale 1:2

