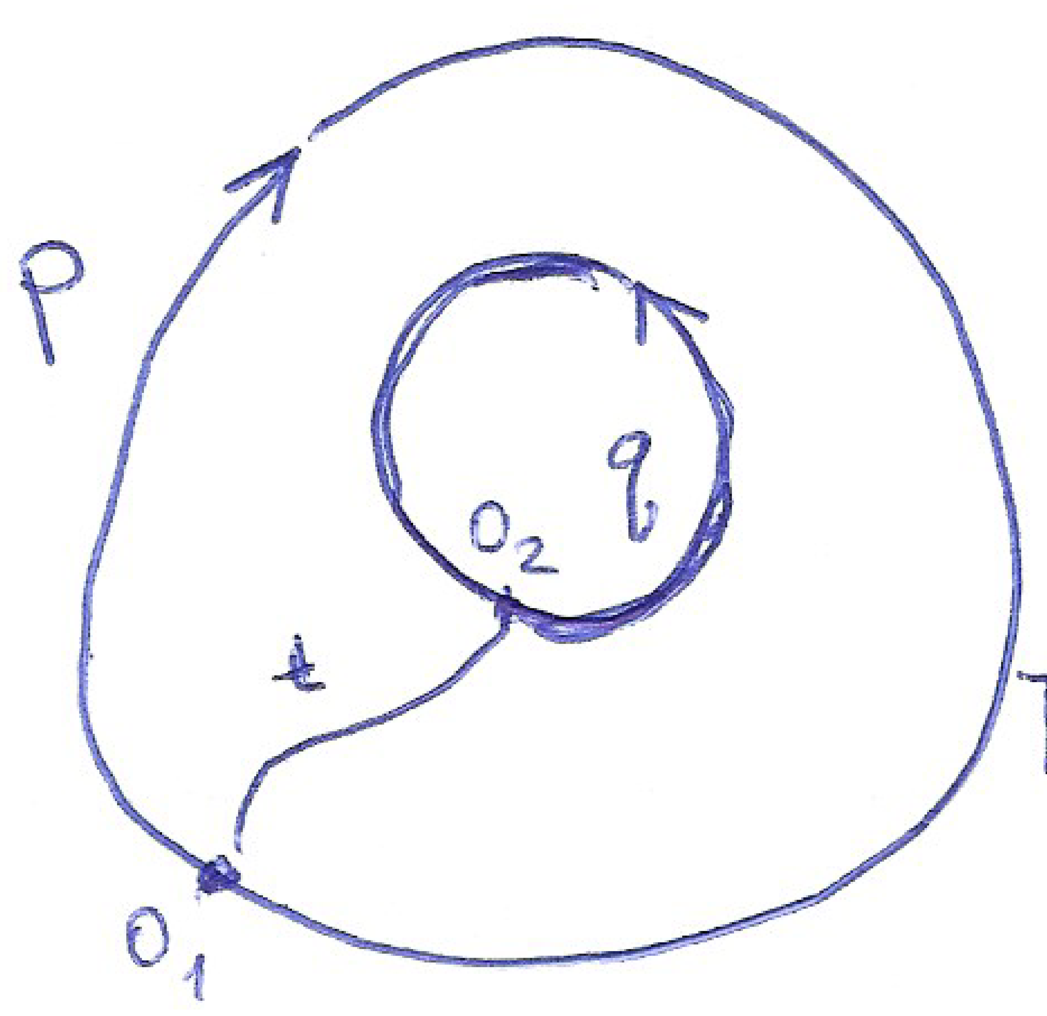
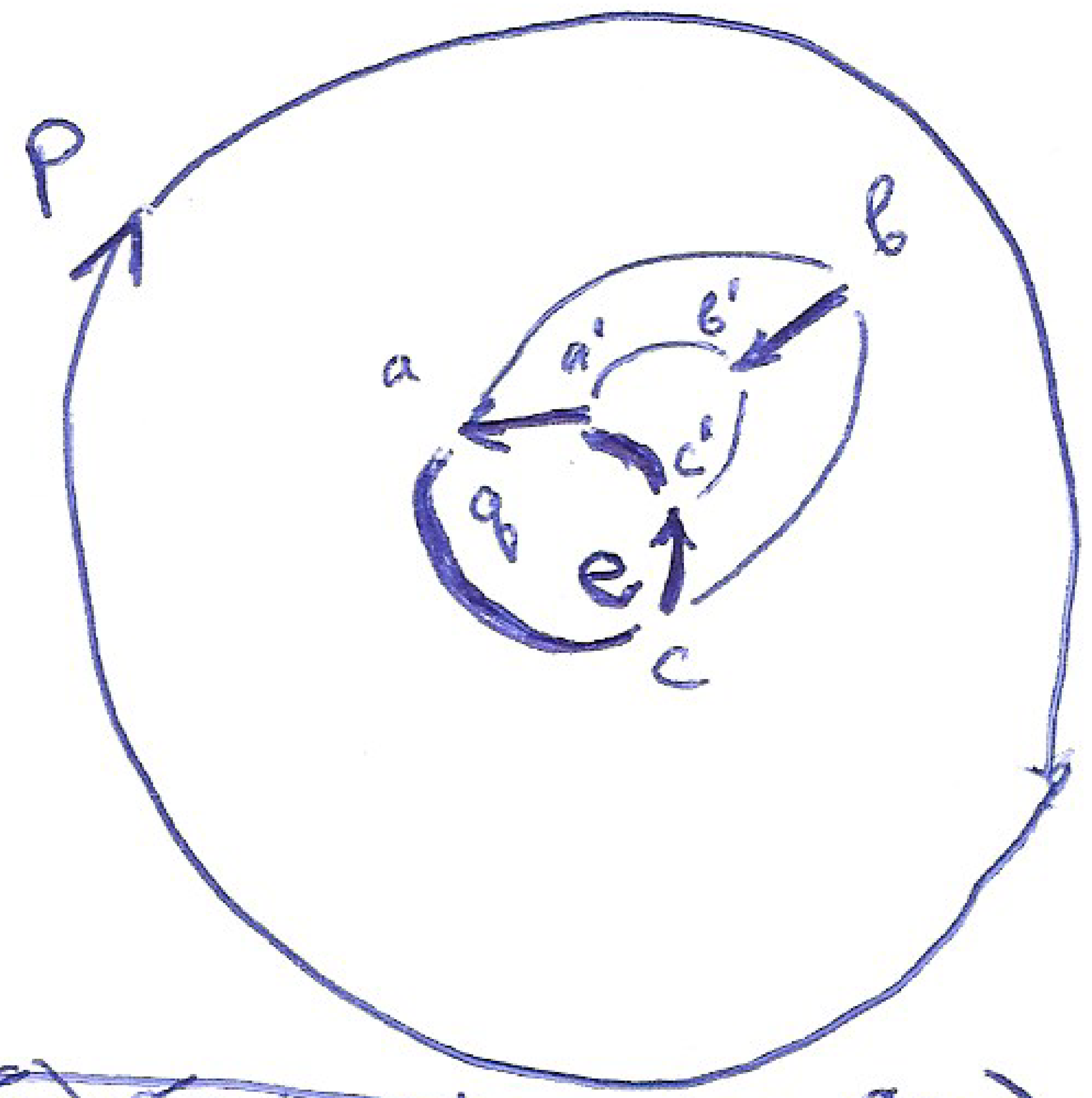
Cutting annular A-maps



L.17.1.

- any loop consisting of 0-edges is contractible to a point.

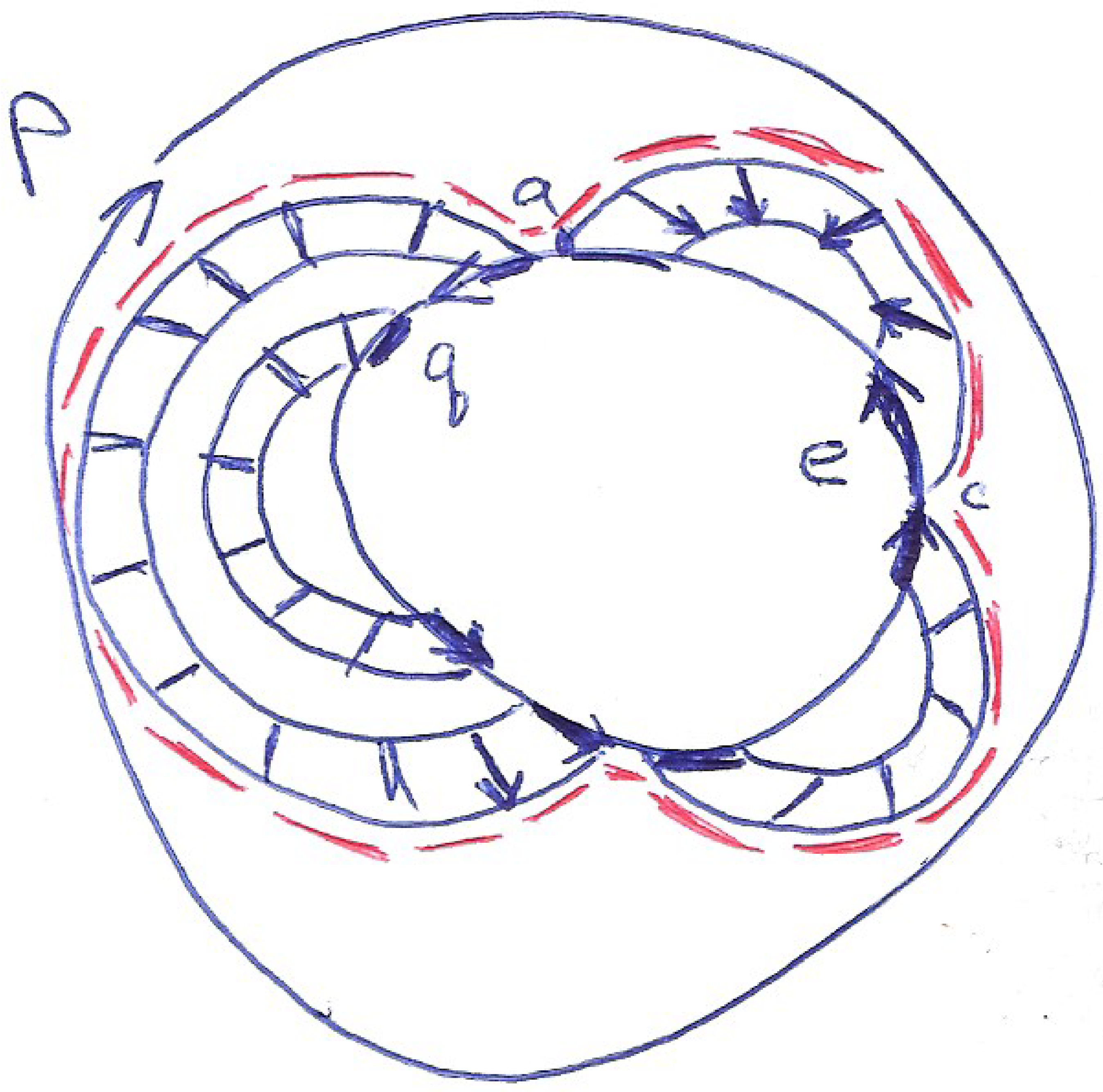
Then $\exists\ o_1, o_2, t\ :\ |t| < \gamma(|p|+|q|)$



Case $r(\Delta)=0$.

When o_1, o_2, t do not exist,

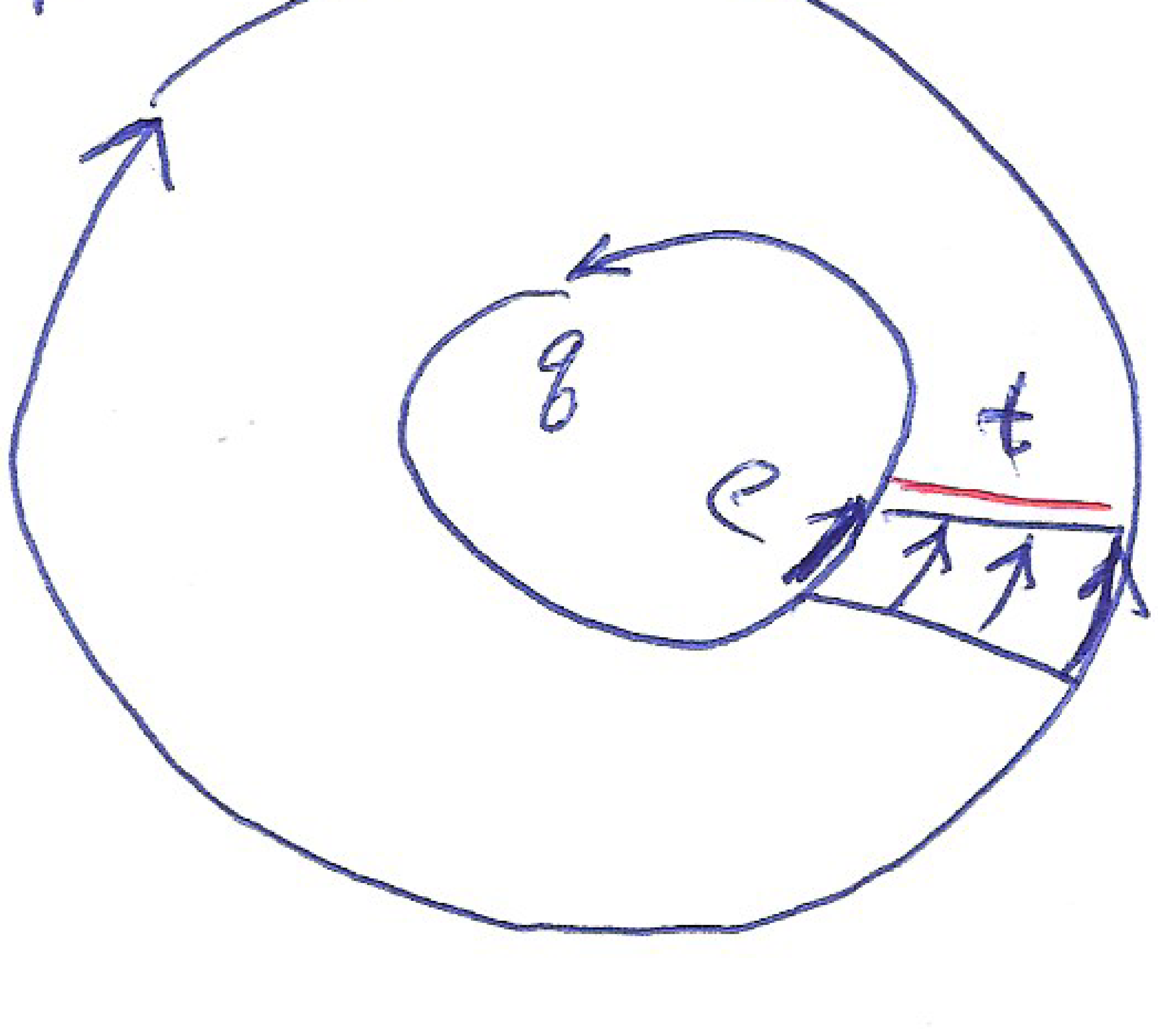
- $\neg\exists\ e \in q$ adjacent to $\in p$
- any cell is of rank 0



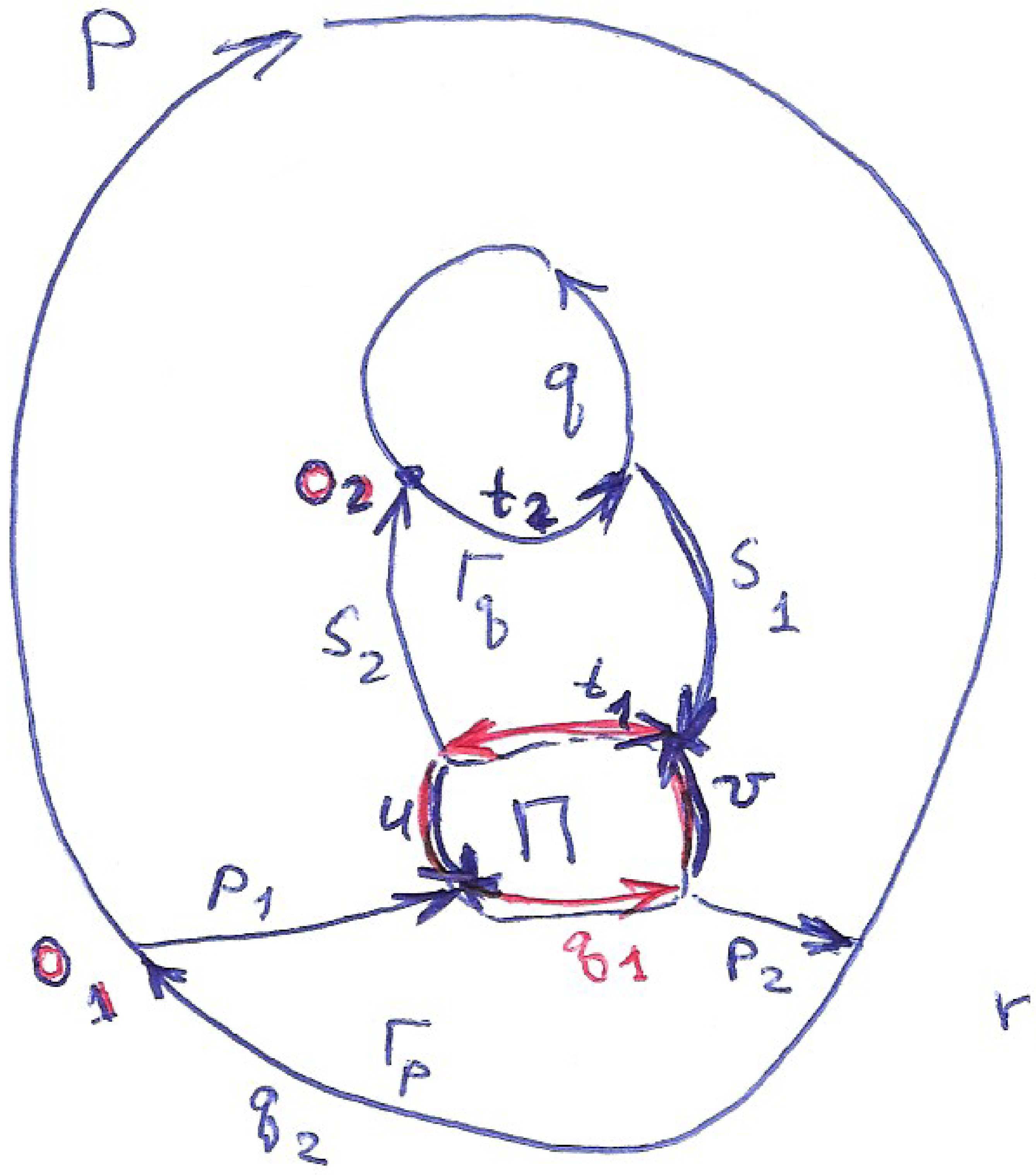
contradiction

when $e \in q$ is adjacent to $\in p$

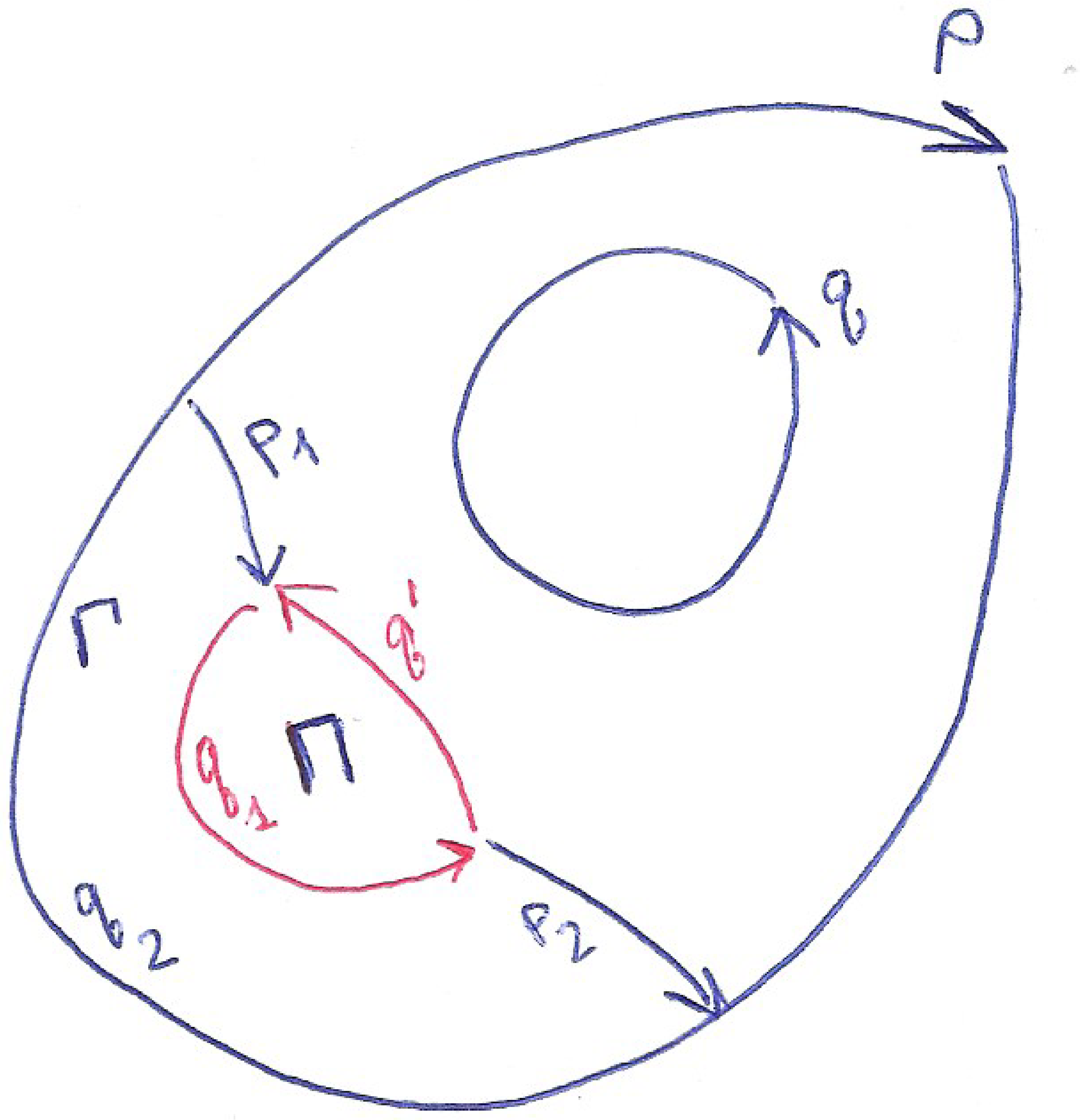
p



Case $r(\Delta) > 0$. Corollary 16.2:



or



$r(\Pi) > 0$

$(\Pi, \Gamma_q, q) + (\Pi, \Gamma_p, p) > \bar{\gamma}$

$(\Pi, \Gamma, p) > \bar{\gamma}$

L.15.4 Let $\psi = (\Pi, \Gamma_q, q)$

Then $|t_2| > (\psi - 2\beta)|\partial\Pi|$, $|t_2| > (\bar{\beta} - 2\zeta\psi^{-1})|q_2|$

and when $\psi \geq \varepsilon$, then $|q_2| < (1 + 2\beta)|t_2|$ and $|q_2| > (1 - 2\beta)|t_2|$

Thus $\overset{|p|}{|q_2|} + \overset{|q|}{|t_2|} >$

$\big((\Pi, \Gamma_q, q) + (\Pi, \Gamma_p, p) - 4\beta\big)|\partial\Pi| > (\bar{\gamma} - 4\beta)|\partial\Pi|$

$|u| + |v| < \gamma|\partial\Pi|$, i.e. $\min(|u|, |v|) < \frac{1}{2}\gamma|\partial\Pi|$

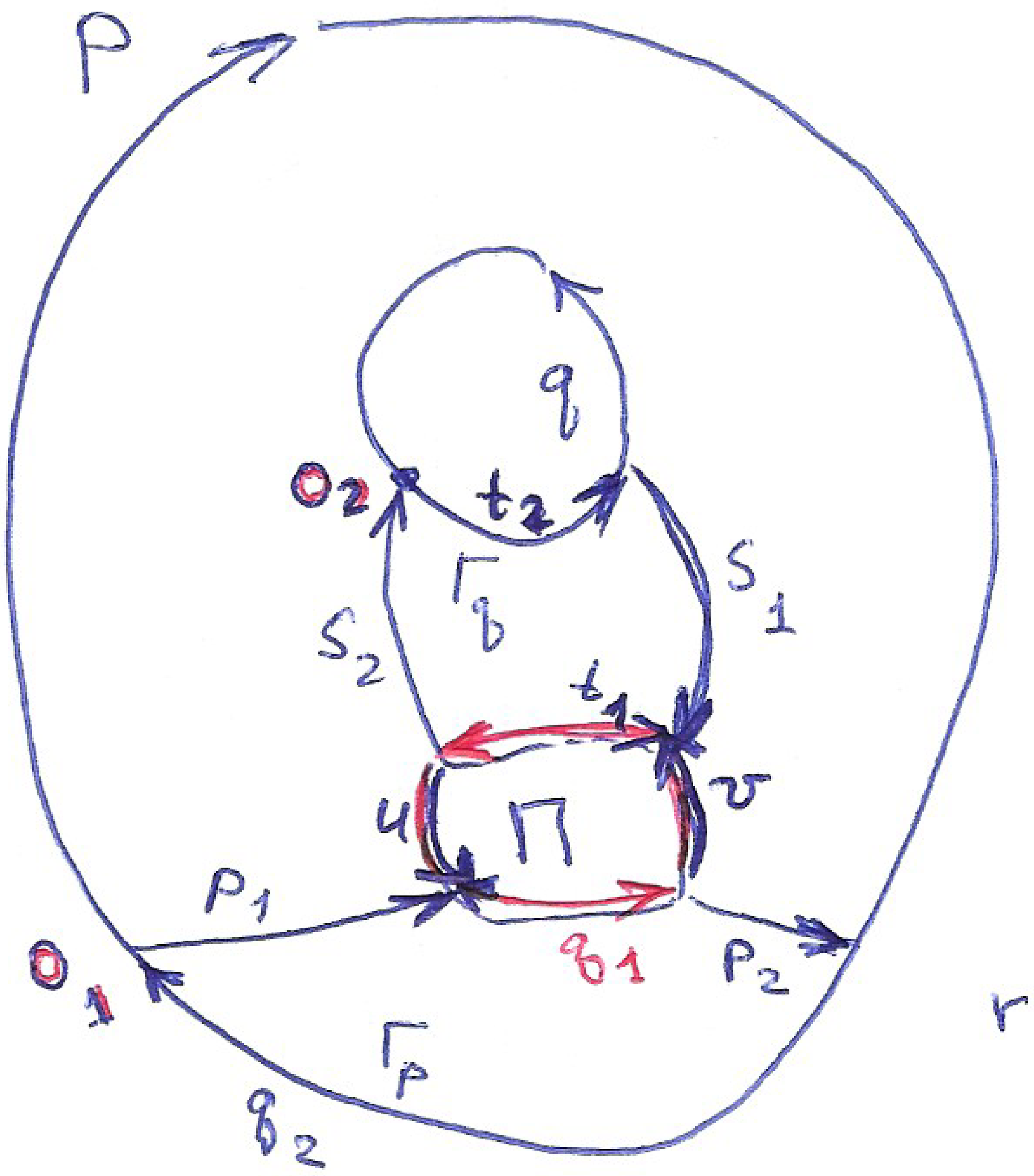
L.15.3 states that $\max(|s_1|, |s_2|) < \underset{\leq\,\zeta|\partial\Pi|}{\zeta n r(\Pi)} > \max(|p_1|, |p_2|)$

When $t = p_1 u^{-1} s_2$ then $|t| < (\frac{1}{2}\gamma + 2\zeta)|\partial\Pi|$

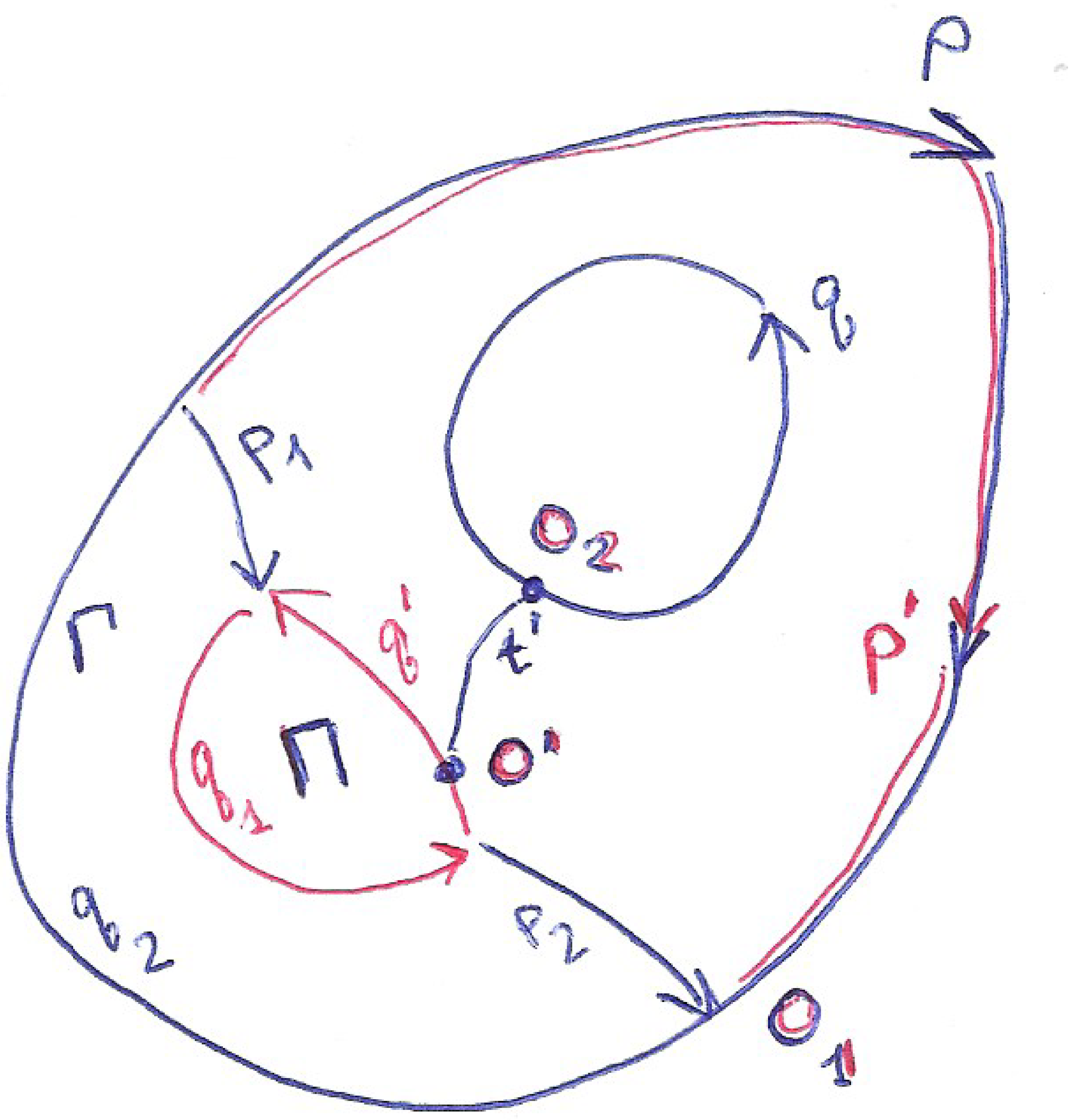
Since $\zeta < \gamma$ we have $(\frac{1}{2}\gamma + 2\zeta)(\bar{\gamma} - 4\beta)^{-1} < \gamma$,

$|t| < \gamma(|p| + |q|)$

Case $r(\Delta) > 0$. Corollary 16.2:



or



$r(\Pi) > 0$

$$(\Pi, \Gamma_q, q) + (\Pi, \Gamma_p, p) > \bar{\gamma}$$

$$(\Pi, \Gamma, p) > \bar{\gamma}$$

By L.15.4 $\quad \underline{|q_2|} > \big((\Pi, \Gamma, p) - 2\beta\big)|\partial\Pi| > \underline{(\bar{\gamma} - 2\beta)|\partial\Pi|}$

By L.15.3 $\quad \max(|p_1|, |p_2|) < \zeta|\partial\Pi|$

Since $|q'| = |\partial\Pi| - (\Pi, \Gamma, p)|\partial\Pi| < (1 - \bar{\gamma})|\partial\Pi| = \gamma|\partial\Pi|$,

we have $\underline{|p_2^{-1} q' p_1^{-1}| < (2\zeta + \gamma)|\partial\Pi|}$

Applying induction to the submap of $p_2^{-1} q' p_1^{-1} p'$

find O', O_2, t' s.t. $|t'| < \gamma\big(|p_2^{-1} q' p_1^{-1}| + \underset{|p| - |q_2|}{\underset{\shortparallel}{|p'|}} + |q|\big) <$

$$\gamma(|p| + |q|) + \gamma(\underbrace{2\zeta + \gamma - \bar{\gamma} + 2\beta}_{<0})|\partial\Pi|$$

$$|t| < |t'| + \tfrac{1}{2}|q'| + |p_2| \le |t'| + \tfrac{\gamma}{2}|\partial\Pi| + \zeta|\partial\Pi| < \gamma(|p| + |q|) +$$

$$(\underbrace{\gamma(2\zeta + 2\gamma - 1 + 2\beta) + \tfrac{1}{2}\gamma + \zeta}_{<0})|\partial\Pi|$$

$\zeta \prec \gamma \prec \beta \prec 1$