Propuesto por Jean Louis Aymé
Problema 845
1. Sea ABCD un cuadrilátero convexo
2. E_u el punto Euler-Poncelet de ABCD
3. PQR el triángulo diagonal de ABCD
4. (O) el circuncírculo de PQR.

Demostrar que (O) contiene a E_u.

Demostración usando coordenadas baricéntricas

Angel Montesdeoca

Euler-Poncelet Point in ENCYCLOPEDIA OF QUADRI-FIGURES (EQF)
http://chrisvantienhoven.nl/mathematics/encyclopedia (Chris van Tienhoven)

Let P1, P2, P3, P4 be the defining Quadrangle Points.
Let S1 = P1.P2 /\ P3.P4, S2 = P1.P3/\ P2.P4 and S3 = P1.P4 /\ P2.P3.
Now S1.S2.S3 is the QA-Diagonal Triangle of the Reference Quadrangle.
(http://www.chrisvantienhoven.nl/other-quadrangle-objects/15-mathematics/quadrangle-objects/artikelen-qa/90-qa-tr1.html)

QA-DT-Coordinate system, where the QA-Diagonal Triangle is defined as the Reference Triangle with barycentric vertice coordinates (1:0:0), (0:1:0), (0:0:1). An arbitrary point of the Quadrangle is defined as (p:q:r). The other 3 points now form the Anticevian triangle of Pi wrt the QA-Diagonal Triangle and have vertices (-p : q : r), (p : -q : r), (p : q : -r).
(http://www.chrisvantienhoven.nl/quadrangle-objects/15-mathematics/quadrangle-objects/artikelen-qa/31-qa-1.html)

Euler-Poncelet Point
(http://www.chrisvantienhoven.nl/quadrangle-objects/10-mathematics/quadrangle-objects/12-qa-p2.html)

Euler mentioned this point in one of his numerous papers.
In 1821 Brianchon and Poncelet, both captains of artillery, wrote a book (Ref-1) in which the orthogonal hyperbola and this point were worked out.
The Euler-Poncelet Point can be defined in different ways.
1. It is the center of the orthogonal hyperbola through P1, P2, P3 and P4.
2. It is the common point of the Nine-point Circles of the triangles Pj.Pk.Pl for all combinations of (j,k,l) ∈ (1,2,3,4).
3. It is the common point of the Pedal Circles of points Pi wrt triangles Pj.Pk.Pl for all combinations of (i,j,k,l) ∈ (1,2,3,4).
This point is also described at Ref-2c, Ref-15f and Ref-42.

Coordinates:
1st DT-Coordinate:
1/(b^2 r^2 - c^2 q^2)

Properties:
QA-P2 lies on the circumcircle (a^2 y z + b^2 x z + c^2 x y = 0) of the QA-Diagonal Triangle.

[1] Brianchon C. J., Poncelet J.-V., Recherche sur la détermination d'une hyperbole équilatère au moyende quatre conditions données, Annales Mathématiques de 1821
* Page 512 about Euler Circles.

[2c] Jean-Louis Ayme, Le Point- d'Euler-Poncelet d'un Quadrilatère, available at http://perso.orange.fr/jl.ayme vol. 8 Le point d'Euler-Poncelet d'un quadrilatère.
* Page 11 Synthetical proof midcircles are concurrent

[15f] 11-3 Miquel-, Poncelet- und Bennett-Punkt eines Vierecks: http://eckartschmidt.de/Pktve.pdf (QL-P1/-P2/-P4)

[42] Darij Grinberg, Poncelet points and antigonal conjugates, available at: http://www.mathlinks.ro/Forum/viewtopic.php?t=109112.