SOLUTION OF THE PROBLEM OF THE MONTH

I suppose that Eratostene known the earth diameter D_{earth} *(by the shadow of the spear…sun elevation…the experiment of Alessandria…);*

The brillance is an invariant and

$P = B\,A\,\Omega$

Where: P=power; B=brillance; A=area of the body; Ω*=solid angle.*

I indicate α_m *the albedo of the body like the ratio between the reflected power and incident power. And also:*

$B_{m/e=}$ *brillance of the moon illuminated by the earth;*
$B_{m/s=}$*brillance of the moon illuminated by the sun;*

sun and earth are lambertian source;

$B_{m/e} = \alpha_m B_{earth}\, \Omega_{earth} / \pi$;
$B_{m/s} = \alpha_m B_{sun}\, \Omega_{sun} / \pi$;
the ratio is equal to:

$B_{m/e} / B_{m/s} = B_{earth}\, \Omega_{earth} / B_{sun}\, \Omega_{sun}$;

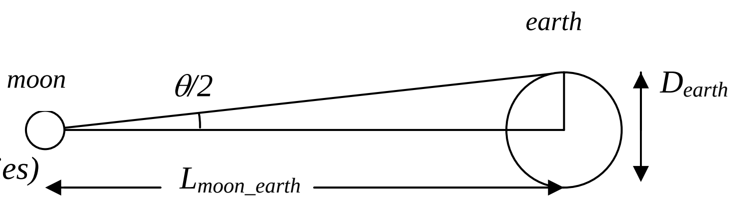
but the brillance of the earth is due the sun (by the albedo α_e*). In fact:*
$B_{earth} = \alpha_e B_{sun}\, \Omega_{sun} / \pi$;

if the quantity α_e *is known then:*

$B_{m/e} / B_{m/s} = \alpha_e\ \Omega_{earth} / \pi$;

but geometrically
$\Omega_{earth=} \pi\, sen^2 \theta$

and $\theta = D_{earth} / L_{moon\_earth}$
and $\theta << 1$ *(and using the Taylor series)*



$\Omega_{earth} = \pi (D_{earth} / L_{moon\_earth})^2$

at finally:

$L_{moon\_earth} = [\alpha_e D^2_{earth}\ B_{m/s} / B_{m/e}]^{1/2}$