$$f(\mathcal{E}) = \frac{1}{\sqrt{8}\pi^2} \left[\int_0^{\mathcal{E}} \frac{\mathrm{d}\Psi}{\sqrt{\mathcal{E} - \Psi}} \frac{\mathrm{d}^2\rho}{\mathrm{d}\Psi^2} + \frac{1}{\sqrt{\mathcal{E}}} \left(\frac{\mathrm{d}\rho}{\mathrm{d}\Psi} \right)_{\Psi=0} \right]$$