$$|\beta(I)| \leq \frac{1}{|\mu|} \qquad \text{with} \qquad \sigma = \pm \arctan\left(\left|\frac{I-1}{I}\right| \sqrt{\frac{(1/\mu)^2 - \beta(I)^2}{\alpha(I)^2 - (1/\mu)^2}}\right).$$