Relativistic mass

Two particles with equal masses \( m \) as measured when at rest are undergoing an inelastic collision as shown in the lab frame \( S \). From the conservation of total momentum in frame \( S \) [mln63],

\[
m(v)v + m(0)0 = M(\bar{v})\bar{v}, \quad v = \frac{2\bar{v}}{1 + \bar{v}^2/c^2},
\]

and the relation

\[
m(v) + m(0) = M(\bar{v}),
\]

between individual masses before the collision and compound mass after the collision [mex221], derive the expression

\[
m(v) = \frac{m_0}{\sqrt{1 - v^2/c^2}},
\]

for the relativistic mass, where \( m_0 = m(0) \) is called the rest mass.

Solution: