Self-Nulling Beam Combiner Using No External Phase Inverter

A self-nulling beam combiner is proposed that completely eliminates the phase inversion subsystem from the nulling interferometer, and instead uses the intrinsic phase shifts in the beam splitters. Simplifying the flight instrument in this way will be a valuable enhancement of mission reliability. The tighter tolerances on \( R = T \) (\( R \) being reflection and \( T \) being transmission coefficients) required by the self-nulling configuration actually impose no new constraints on the architecture, as two adaptive nullers must be situated between beam splitters to correct small errors in the coatings.

The new feature is exploiting the natural phase shifts in beam combiners to achieve the 180° phase inversion.