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◄ Previous result | Next result ► | Search results ± | This issue ▲ | Article options & Content finder ▼
Search result 6 of 7.

Projection of relativistically moving objects on a two-dimensional plane, the `train' paradox and the visibility of the Lorentz contraction

E B Manoukian and S Sukkhasena
School of Physics, Suranaree University of Technology, Nakhon Ratchasima 30000, Thailand

Abstract. Although many papers have appeared on the theory of photographing relativistically moving objects, pioneered by the classic work of Penrose and Terrell, three problems remain outstanding. (1) There does not seem to exist a general formula which gives the projection of a relativistically moving object, applicable to any object no matter how complicated, on a two-dimensional plane in conformity with Terrell's observation. (2) No resolution seems to have been provided for the associated so-called `train' paradox. (3) No analytical demonstration seems to have been offered on how the Lorentz contraction may be actually detected on a photograph. This paper addresses all of these three problems. The analysis does not require any more than trigonometry and elementary differentiation.