|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Time (T, t)** | **Length of Platform (L)** | **Length of Train (l)** | **Speed of Plane (w, u)** |
| **Platform** |  |  |  |  |
| **Train** |  |  |  |  |

Through the principles of symmetry, notably that all frames should experience the same physics, a relationship can be established between the length of the platform and the length of the train:

By appropriately substituting values of the equations in the table above, *w* can be expressed in terms of *u, v,* and *R*.

In its symmetrical frame of reference, the plane observes the train travelling at a speed of *–v* and the platform travelling at a speed of *–w*. The same symmetry establishes the following:

Which can be simplified:

And rearranged to: thus showing special relativity based only on the assumption of physical symmetry.