

Space Tourism Pricing Model Revolution from Time Independent Model to Time-Space Model

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Abstract : Space tourism emerged in 2001 and became famous in 2021, following the development of space technology. The space market is twisted because of the excess demand. Space tourism is currently rare and extremely expensive, with biased luxury product pricing, which is the seller's market that consumers can not bargain with. Spaceship companies such as Virgin Galactic, Blue Origin, and Space X have been charged space tourism prices from 200 thousand to 55 million depending on various heights in space. There should be a reasonable price based on a fair basis. This study aims to derive a spacetime pricing model, which is different from the general pricing model on the earth's surface. We apply general relativity theory to deduct the mathematical formula for the space tourism pricing model, which covers the traditional time-independent model. In the future, the price of space travel will be different from current flight travel when space travel is measured in lightyear units. The pricing of general commodities mainly considers the general equilibrium of supply and demand. The pricing model considers risks and returns with the dependent time variable as acceptable when commodities are on the earth's surface, called flat spacetime. Current economic theories based on the independent time scale in the flat spacetime do not consider the curvature of spacetime. Current flight services flying the height of 6, 12, and 19 kilometers are charging with a pricing model that measures time coordinate independently. However, the emergence of space tourism is flying heights above 100 to 550 kilometers that have enlarged the spacetime curvature, which means tourists will escape from a zero curvature on the earth's surface to the large curvature of space. Different spacetime spans should be considered in the pricing model of space travel to echo general relativity theory. Intuitively, this spacetime commodity needs to consider changing the spacetime curvature from the earth to space. We can assume the value of each spacetime curvature unit corresponding to the gradient change of each Ricci or energy-momentum tensor. Then we know how much to spend by integrating the spacetime from the earth to space. The concept is adding a price p component corresponding to the general relativity theory. The space travel pricing model degenerates into a time-independent model, which becomes a model of traditional commodity pricing. The contribution is that the deriving of the space tourism pricing model will be a breakthrough in philosophical and practical issues for space travel. The results of the space tourism pricing model extend the traditional time-independent flat spacetime mode. The pricing model embedded spacetime as the general relativity theory can better reflect the rationality and accuracy of space travel on the universal scale. The universal scale from independent-time scale to spacetime scale will bring a brand-new pricing concept for space traveling commodities. Fair and efficient spacetime economics will also bring to humans' travel when we can travel in lightyear units in the future.

Keywords : space tourism, spacetime pricing model, general relativity theory, spacetime curvature

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