Classification and evolution of bifurcation curve of positive solution for the one-dimensional Minkowski-curvature problem

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In this paper, we study the bifurcation curve of positive solution for the one-dimensional Minkowski-curvature problem

$$\begin{cases} -\left(u'/\sqrt{1-u'^2}\right)' = \lambda f(u), \text{ in } (-L,L), \\ u(-L)=u(L)=0, \end{cases}$$

where $\lambda, L>0$, $f\in C[0,\infty)\cap C^2(0,\infty)$ and $f(u)>0$ for $u\geq 0$. We classify the shape of bifurcation curve S_L for $L>0$, and further determine the evolution of bifurcation curve S_L with varying $L>0$. In addition, we show that, for sufficiently large L, the bifurcation curve S_L has arbitrary many turning points. Finally, we apply these results to obtain the global bifurcation diagrams for *Ambrosetti-Brezis-Cerami problem*, *Liouville–Bratu–Gelfand problem* and *perturbed Gelfand problem* with the Minkowski-curvature operator, respectively. Moreover, we can compare and list the different properties with corresponding semilinear problems and prescribed curvature problems.