Rotational surfaces with prescribed curvatures

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Abstract: Based on the notion of *geometric linear momentum* of a plane curve [2], we made a contribution to the study of rotational Weingarten surfaces in Euclidean 3-space (see [1]) reducing any type of Weingarten condition on a rotational surface (i.e. a functional relation between the principal curvatures, see [4]) to a first order differential equation on the momentum of the generating curve.
Using a similar technique, we now deal with the problem of prescribing different types of curvatures (principal curvatures, mean curvature, Gauss curvature, Casorati curvature, harmonic mean curvature) on rotational surfaces in terms of arbitrary continuous functions depending on the distance from the surface to the axis of revolution.
Compared to Kenmotsu's idea in [3], instead of taking an *intrinsic* parameter such as the arc length of the generating curve as the independent variable of the functions to be prescribed, we choose an *extrinsic* natural variable such as the distance from the surface to the axis of revolution and the calculations are equally feasible to carry out.

References

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