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## Study on Electromagnetic Force Distribution and Material Forming Performance in Electromagnetic Tube Expansion with Concave Coils

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In the electromagnetic tube expansion process, both electromagnetic force and workpiece deformation are axisymmetric. Hence, the forming performance of tube is better than that of sheet and then electromagnetic tube expansion is widely used in industry processing. However, the cylindrical coil is always applied to generate the electromagnetic force in electromagnetic tube expansion process at present, the radial electromagnetic force in the tube end is less than that in the tube middle because of the end effect, with the result that the workpiece deformation could not meet the industrial requirements. In order to obtain more uniform radial electromagnetic force in the axial direction, electromagnetic tube expansion method with concave coils is proposed in this paper. Firstly, the effect of coil structure parameters on the radial electromagnetic force distribution is studied. Secondly, the concave coils for a given workpiece is designed to meet the workpiece deformation requirements. Finally, the advantages of using concave coils in electromagnetic tube expansion are verified by comparing the workpiece forming performance of cylindrical and concave coils.

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