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On the regularity of the axisymmetric, swirl-free solutions of the Euler equation in four and higher dimensions

In this talk, we will discuss the axisymmetric, swirl-free Euler equation in four and higher dimensions. We will show that in four and higher dimensions the axisymmetric, swirl-free Euler equation has properties which could allow finite-time singularity formation of a form that is excluded in three dimensions. We will also consider a model equation that is obtained by taking the infinite-dimensional limit of the vorticity equation in this setup. This model exhibits finite-time blowup of a Burgers shock type. The blowup result for the infinite dimensional model equation heavily suggests that smooth solutions of the Euler equation exhibit finite-time blowup in sufficiently high dimensions.