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## عنوان مقاله:

Mechanism of Vortices Appearance in the Taylor-Couette Flow System


## محل انتشار:

دوماهنامه مکانیک سیالات کاربردی, دوره 15, شماره 1 (سال: 1401)

تعداد صفحات اصل مقاله: 9



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## خلاصه مقاله:

This work is devoted to study the Taylor-Couette flow at the early structuring stages. It is aimed to gain insight on the Taylor and Ekman vortices genesis mechanism since the first hints of presence detected at Ta=۱۰-۴. Simulations are carried out using Ansys Fluent software package. The basic system geometry is characterized bya height H= ۱۵۰mm, ratio of inner to outer cylinder radii η= ۰.۹, radial gap δ= ۰.۱۱ and an aspect ratio corresponding to system height reported togap length, Γ= H/δ = ۱۵. Ekman and Taylor cells are tackled since the Taylor number Ta=۱۰-۴ to the first (TVF) and second (WVF) instabilities settlement at Tac۱= ۴۳.۸ and Tac۲= ۵۴, respectively. It is sought to shed light on the underlying mechanism responsible for flow genesis and to identify all the intermediate successive steps from ex-nihilo when the system is at rest up to complete vortices formation. The obtained results show that presence of Ekman cells is already perceptible since a Taylor number as low as Ta= ۱۰-۴. In fact, localized overpressure zones are detected on system inner endcaps surfaces regularly distributed according to a π/۲ phase lag. These overpressure zones azimuthally propagate to meet and cover the entire gap circumference when Ta~۱۰-۲ to۱۰-۱.



## کلمات کلیدی:

CFD, Taylor-Couette flow, Ekman cells, Fluent software, TVF, WVF



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