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Elliptical Instability in a Rotating Spheroid

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This study concerns the elliptical instability of a flow in a rotating deformed sphere. The aim of our work is to observe and measure the characterics of this instability in experiments and to compare them with theorical predictions. For this purpose, an elastic and transparent hollow sphere has been moulded. The flow is visualised using Kalliroscope flakes as the sphere is set into rotation and compressed by two rollers. The elliptical instability occurs by the appearance of the so-called ‘spin-over’ mode whose growth rates and saturations are measured for different Eckman numbers by video image analysis. These growth rates compare avantageously to theoretical calculations which are performed using classical asymptotic expansions. The linear analysis is then completed by a non linear model which predicts correctly the asymptotic regimes for high Eckman numbers.

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