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A numerical experiment that provides new results regarding the inception of separation in the flow around a circular cylinder NIKOLAOS MALAMATARIS, George Mason University, ANASTASIOS LIAKOS, United States Naval Academy — The exact value of the Reynolds number regarding the inception of separation in the flow around a circular cylinder is still a matter of research. This work connects the inception of separation with the calculation of a positive pressure gradient around the circumference of the cylinder. The hypothesis is that inception of separation occurs when the pressure gradient becomes positive around the circumference. From the most cited laboratory experiments that have dealt with that subject of inception of separation only Thom has measured the pressure gradient there at very low Reynolds numbers (up to Re=3.5). For this reason, the experimental conditions of his tunnel are simulated in a new numerical experiment. The full Navier Stokes equations in both two and three dimensions are solved with a home made code that utilizes Galerkin finite elements. In the two dimensional numerical experiment, inception of separation is observed at Re=4.3, which is the lowest Reynolds number where inception has been reported computationally. Currently, the three dimensional experiment is under way, in order to compare if there are effects of three dimensional theory of separation in the conditions of Thom's experiments.

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