1047-35-485   **Qingshan Chen*** (`qinchen@indiana.edu`), Department of Mathematics, Indiana University, Bloomington, IN 47405, and **Ming-Cheng Shiue** and **Roger Temam**. *The zero mode for the Primitive Equations.* Preliminary report.

Considering an expansion of the inviscid Primitve Eqations in the vertical direction, we classically obtain an infinite set of equations which have been studied in different contexts by two of the authors (QC and RT), and by A. Rousseau and J. Tribbia. This lecture is devoted to the (first) zero mode which is different from the others. This mode is of course the most energetic one and thus the most important one. In the linearized case we show that this mode is governed by equations which ressemble the two- dimensional (linearized) Euler equations, but are still different from these equations with several respects. After introducing the necessary concepts, we will discuss the well-posedness of the equations for the zero mode which is not standard . We will then discuss its discretization based on suitable forms of the projection method. And finally we will show results of numerical simulations performed in both the linear and nonlinear cases (with coupling with all the other modes for the nonlinear case). (Received February 03, 2009)

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