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<b>Oral or Poster Presentation?</b>	Poster

**Summary:**

System inertia directly affects the power system's frequency response when an active power imbalance between generation and demand occurs. Therefore, determining the inertia level is becoming crucial to the system operators to ensure the secure and stable operation of a power system. This work presents a method for estimating the total inertia of a generation bus considering only frequency and active power measurements recorded by Phasor Measurement Units (PMUs). The method allows online inertia monitoring utilizing ambient data, while a disturbance is not required to provide sufficient excitation to the system for accurate estimation. The Least Squares (LS) method is applied for parameter estimation to extract the inertia values from the identified models. Three different models have been studied to approximate the system's ambient response and extract the value of the inertia constant. The effectiveness of the proposed approach is demonstrated using actual measurements obtained from two substations of the Cyprus power system.