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Earthquake Forecasting Procedure Due to Diurnal Stress Transfer by the Core to the Crust

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Abstract : In this paper, our goal is determination of loading versus time in crust. For this goal, we present a computational procedure to propose a cumulative strain energy time profile which can be used to predict the approximate location and time of the next major earthquake (M > 4.5) along a specific fault, which we believe, is more accurate than many of the methods presently in use. In the coming pages, after a short review of the research works presently going on in the area of earthquake analysis and prediction, earthquake mechanisms in both the jerk and sequence earthquake direction is discussed, then our computational procedure is presented using differential equations of equilibrium which govern the nonlinear dynamic response of a system of finite elements, modified with an extra term to account for the jerk produced during the quake. We then employ Von Mises developed model for the stress strain relationship in our calculations, modified with the addition of an extra term to account for thermal effects. For calculation of the strain energy the idea of Pulsating Mantle Hypothesis (PMH) is used. This hypothesis, in brief, states that the mantle is under diurnal cyclic pulsating loads due to unbalanced gravitational attraction of the sun and the moon. A brief discussion is done on the Denali fault as a case study. The cumulative strain energy is then graphically represented versus time. At the end, based on some hypothetic earthquake data, the final results are verified.

Keywords : pulsating mantle hypothesis, inner core’s dislocation, outer core’s bulge, constitutive model, transient hydro-magneto-thermo-mechanical load, diurnal stress, jerk, fault behaviour
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