

## INTISARI

*United Nations Educational Scientific and Cultural Organization* (UNESCO) menyatakan Candi Prambanan menjadi situs warisan dunia pada tahun 1991. Candi ini berada di jalur sesar aktif yaitu Sesar Opak. Gerakan aktif dari sesar tersebut dapat menyebabkan pergerakan bangunan Candi Prambanan. Candi Prambanan dibangun di atas struktur tanah yang tidak stabil berupa pasir sehingga menyebabkan struktur candi yang tidak stabil pula. Hal tersebut mendorong penelitian berkala dilakukan untuk pemantauan deformasi Candi Prambanan. Penelitian kala I dilakukan pada tahun 2020 dengan fokus deformasi vertikal titik pantau Candi Prambanan sedangkan penelitian ini berfokus pada pemantauan deformasi vertikal titik ikat dan titik pantau Candi Prambanan sebagai kala II.

Penelitian ini menggunakan data kala I dan II berupa nilai tinggi dan jarak datar antar titik ikat serta data sudut *helling* dan jarak datar antar titik pantau. Pengamatan dilakukan dengan *Waterpass* (WP) untuk titik ikat dan *Total Station* (TS) untuk titik pantau. Hasil pengukuran diolah dengan hitung perataan metode parameter *minimum constraint* untuk titik ikat dan metode kombinasi untuk titik pantau yang dilanjutkan dengan analisis pergerakan vertikal. Analisis deformasi vertikal dilakukan dengan uji signifikansi beda parameter dengan tingkat kepercayaan 95% pada titik ikat serta titik pantau.

Hasil penelitian ini berupa nilai tinggi kala II dan ketelitiannya serta nilai pergerakan vertikal titik ikat dan titik pantau. Nilai ketelitian titik ikat sebesar 0,03 mm s.d 0,05 mm dan titik pantau sebesar 0,3 mm s.d 3,5 mm. Nilai pergerakan vertikal titik ikat ke atas sebesar 0,6 mm s.d. 1,2 mm dan nilai pergerakan vertikal titik ikat ke bawah sebesar -0,2 mm s.d. -1,7 mm. Nilai pergerakan vertikal titik pantau ke atas sebesar 2,7 mm s.d. 7,0 mm dan nilai pergerakan vertikal titik pantau ke bawah sebesar -0,2 mm s.d. -6,9 mm. Hasil uji signifikansi dengan derajat kepercayaan 95% menunjukkan bahwa setiap titik ikat tidak bergerak secara signifikan kecuali titik Z2 dan titik pantau bergerak secara signifikan kecuali titik Bu, Sb, Wb, Wt, Nt, Gt, dan At dengan besaran relatif kecil hanya fraksi milimeter.

**Kata kunci:** Candi Prambanan, metode parameter *minimum constraint*, metode kombinasi, deformasi vertikal, kecepatan pergerakan vertikal.

## ABSTRACT

The United Nations Educational Scientific and Cultural Organization (UNESCO) declared Prambanan Temple a world heritage site in 1991. This temple is located on an active fault line known as Opak Fault. The dynamic movement of the fault causes a movement of the Prambanan Temple building. The Prambanan temple was built above an unstable soil structure in the form of sand, causing the temple structure to be unstable as well. This condition encourages periodic research to monitor the deformation of the Prambanan Temple. The first epoch of the study was conducted in 2020 with a focus on the vertical monitoring point movement of the Prambanan Temple, while this study focused on the vertical monitoring and control point movements as a second epoch.

The research used epochs I and II measurement data in height and horizontal distances between control points, *helling* angles, and horizontal distances between monitoring points. Observations were carried out with a Water pass (WP) measuring instrument for the control point and a Total Station (TS) for the monitoring point. The processing data used adjustment computation with minimum parameter method for control point and combination method for monitoring point followed by an analysis of vertical movement. In addition, an analysis of vertical deformation was carried out by testing the significance of different parameters with a 95% at the control and monitoring points.

The study results are the second epoch high value, its accuracy, and the vertical movement of the control and monitoring points. The accuracy of the control point is 0,03 mm to 0,05 mm, and the monitoring point is 0,3 mm to 3,5 mm. The vertical movement of the control point upward is 0,6 mm to 1,2 mm, and the vertical movement of the monitoring point downward is -0,2 mm to -1,7mm. The vertical movement of the monitoring point upward is 2,7 mm to 7,0 mm, and the vertical movement of the downward monitoring point is -0,2 mm to -6,9 mm. Each control point moved insignificantly except for Z2, and the monitoring point moved significantly except for points Bu, Sb, Wb, Wt, Nt, Gt, and At. The results of the significance test with a 95% confidence level showed that each control point did not move significantly except for the Z2 point and the monitoring point moved significantly except for the Bu, Sb, Wb, Wt, Nt, Gt, and At points with a relatively small value of only a fraction of millimeters.

**Keywords:** Prambanan Temple, minimum constraint parameter method, combination method, vertical deformation, vertical movement.