

结构面产状换算程序在工程地质中的应用

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摘 要: 介绍产状换算程序的编制方法、特点、适用范围及如何应用。

关键词: 产状换算程序; AutoCAD; LISP 语言

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1 前 言

随着计算机的发展, 工程地质专业普遍用 AutoCAD 进行制图, 虽然 AutoCAD 的功能很强大, 适应的专业也很广, 但未能完全解决各专业在制图中所遇到的实际问题, 因此, 开发适应专业特点的应用程序尤显重要。

工程地质专业在长期的生产过程中, 剖面图上构造线的产状换算为查表法及计算器法, 方向靠人为地判断, 既繁琐又易出错, 若编制成产状换算程序, 则有许多优越性。

2 产状换算的数学原理

当剖面方向与结构面走向斜交时, 剖面上的视倾角计算公式如下:

$$\tan\beta' = \tan\beta \sin\theta$$

式中 β' ——结构面视倾角;
 β ——结构面真倾角;
 θ ——结构面走向与剖面方向的夹角。

3 程序的编制

程序用 AutoCAD LISP 语言编制, 原程序如下:

```
(defun a2d(a/d)
  (setq d(/(* 180a)pi))
  )

  (defun c: thlw (/a p0 ll h d fx ft ja scjp1 fa1 tt
hd h1 h2 h3)
  (if(null ia) (setq ia 0))
  (if(not(setq a (getint(strcat"\n 剖面左端方位
角< "(itoa ia)"> :"))))
    (setq a ia)
    (setq ia a)
  )
)
```

```
(setq a(/(* a pi)180 0))
(setq p0(getpoint"\n 起点坐标: "))
(setq ll(getdist P0"\n 线段长: "))
(setq h1(getstring 1"\n 走向: "))
(setq h2(getstring 1"\n 倾向: "))
(setq h3(getangle"\n 走向角: "))
(setq d(getangle"\n 倾向角: "))
(cond
  ((and(= h1"nw") (= h2"ne"))
    (setq h h3))
  ((and(= h1"ne") (= h2 "nw "))
    (setq h(- pi h3)))
  ((and(= h1"nw") (= h2"sw "))
    (setq h(+ pi h3)))
  ((and(= h1"ne") (= h2"se"))
    (setq h(- (* 2 pi)h3)))
  )
(setq fx(abs(- a h)))
(setq ft(/(* fx 180)pi))
(setq ja(abs(- a (+ h(/pi 2)))))
(setq scj(abs(atan (* (sin ja) (/sin d) (cos
d)))))
(setq scj(if(or(< ft 90) (> ft 270)) scj(- 0
scj)))
(setq p1(polar p0 scj ll))
(setq f(angle p0 p1))
(setq a1(/(* f 180)pi))
(command"pline"p0 p1"")
(setq hd(a2d h))
(cond
  ((and(> hd 0) (< hd 90))
    (setq zx1"N "zx2"W "qx"NE"ha hd))
  )
)
```

5 结束语

波罗电站隧洞混凝土衬砌由于引入程序模块管理模式,加快了施工进度,效果显著。笔者由于直接参与了此模式的制定和实施,得到以下几点感受和体会。

(1)这种模式最大的优点就是节省时间,大大加快施工进度。通过对工程项目的仔细分析,设置模块,实施流水作业,在模块内省去每个仓号的布置工作地、准备与结束时间,明显提高了施工进度。

(2)施工管理简单易行,但必须调度有力、控制有方。在施工过程中严格执行流水作业,及时输入元素,调整偏差。

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```
((and(> hd 90)(< hd 180))
  (setq zx1"N "zx2"E"qx"NW "ha(- 180
hd)))
((and(> hd 180)(< hd 270))
  (setq zx1"N "zx2"W "qx"SW "ha(- hd
180)))
((and(> hd 270)(< hd 360))
  (setq zx1"N "zx2"E"qx"SE"ha(- 360
hd))))
(setq tt(strcat zx1(rtos ha 2 0))"% % d"zx2"/"
qx" "(rtos(a2d d)2 0))"% % d"))
(command"text" p0 "3" a1 tt"))
)
```

4 程序的使用方法与原则

- (1)程序在 AutoCAD 中调入然后输入程序名。
- (2)剖面左端方位角是以正东为零点逆时针旋转计算角度,具有存储功能。
- (3)岩层产状为勘测角。
- (4)起点坐标必须已知,输入坐标值或在图形中捕捉一点均可。
- (5)线段长度输入或拖动长度均可。
- (6)岩层产状自动标入。
- (7)使用举例如下:某工程岩层产状为 N 60 °E/SE 50 °;剖面左端测角为 S30 °W,换算成输入方位角为 240 °。

Command: th lw
剖面左端方位角< 0> : 240
起点坐标:
线段长:
走向: ne
倾向: se

(3)通过模块设置和工序细分,可以进行措施优化,以方便施工、节约成本。隧洞混凝土衬砌在优化过程中,省去了底部 3 排插筋及相应螺栓、横向联系与竖向支撑、改堵头板直接为分缝板等,使成本得到了有效地控制,经济效益显著。

(4)应用前途广阔,具有一定的推广价值。该模式不仅适用于隧洞,如果进一步深化和完善,还可以在公路、大坝甚至厂房工程中得到广泛地应用。

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走向角: 60
倾向角: 50
显示结果见图 1。

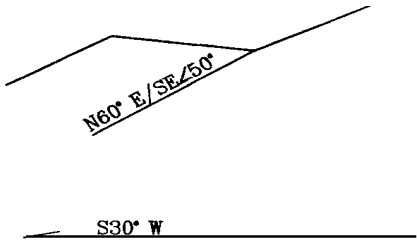


图 1 计算成果图

5 程序的适用范围

- (1)适用于 AutoCAD R12 版本及更高的版本。
- (2)适用于地质图件的剖面图、平硐展示图的岩层、节理、断层等结构面产状换算。

6 程序的特点

- (1)具有自动换算视倾角和判断在剖面中的倾角方向。
- (2)精度高。
- (3)速度快。
- (4)减少了人为的判断错误。

7 结束语

为了达到图件的美观、准确、省时、便于资料的保存及修改等,使用 AutoCAD 的人已逐渐增多,在工程地质制图工作中将会遇到许多问题及重复性操作,因此用 LISP 语言编程将会解决产状换算等许多问题,提高生产效率;其它如平面图上产状、钻孔、地质点及平硐展示图等均可用 LISP 语言编程并能降低工作强度。

在程序的编制过程中得到李杰、任鸣春两位同志的大力帮助,在此表示感谢。

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ABSTRACT

Genetic Threshold Auto-Regressive Model for Predicting Annual Run-Off

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Abstract: To effectively utilize the important information of the section interdependence during the time series of annual run-off, threshold auto-regressive (TAR) model is suggested to predict annual runoff. A simple and general scheme is presented for establishing TAR model. With the improved genetic algorithm by the authors, both of threshold values and auto-regressive coefficients can be optimized, and the difficulty problem of modeling of TAR is resolved, which gives a strong tool for widely applying TAR model. The case study shows that the scheme is practical and efficient, and that TAR model can successfully reduce model errors, and ensure good stability and accuracy of the model forecasting by controlling threshold values. As a general method, the scheme has major theoretic value and wide-ranging application for predicting of nonlinear time series.

Key words: annual runoff; time series; prediction; threshold auto-regressive model; genetic algorithm

Characteristics of Stress and Displacement in Rockfill Dam with Bituminous Concrete Core

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Abstract: The paper mainly presents distribution of stress and displacement in rockfill dam with bituminous concrete core under self weight, water pressure and lateral pressure of rockfill. It is assuredly helpful to well know these characteristics for either proper design of rockfill dam with bituminous concrete core, or reasonable construction.

Key words: bituminous concrete; core; rockfill dam; stress; displacement

Vertical Lathe Rebuild and Turbine Guide Vane Bearing Hole Bored Together

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Abstract: For repair for spare parts of turbine, a series of more integrated repairing techniques are summarized by our plant through continuous research and practice. Vertical boring head is refitted on vertical lathe to bore turbine head cover and guide vane bearing hole on bottom ring together. In this way, precision and speed for back installation in general overhaul is improved and economic benefit is obvious. It is valuable to popularize this technique at power plants in a mountainous area.

Key words: vertical lathe; rebuild; guide vane bearing hole; bore together

Construction and Operation for Large Span Steel Truss Bridge

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Abstract: Construction of large span steel truss bridge for intake tower of headrace at Tianshengqiao I Hydropower Station is introduced, including fabrication, transportation, installation and test. It is provided to similar projects for reference.

Key words: intake tower; access bridge; steel truss; bridge floor system; dead load test

Optimization of Technical Parameters for Mono-tuning Harmonic Filter

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Abstract: On the basis of discussion about the magnified harmonic currents caused by the filter, some point of views about coordinating and choosing parameters of filter are put forward, especially on the capacity distribution of the capacitors and reactors, the percentage of the filtered harmonic currents and grouping. In addition, there must be some control strategies taken to attain a comprehensive optimization, the control restraints undermentioned could be taken. Finally, an actual electric traction station is studied, the simulated results are analysed.

Key words: mono-tuning harmonic filter; tuning degree; filter rate

Application of Orientation Conversion Program for Discontinuous Plane in Engineering Geology

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Abstract: Preparation, characteristics, application domain and application method of orientation conversion program are presented in the paper.

Key words: orientation conversion program; Auto CAD; Lisp Language

Theory and Application of Flood Control Decision Support System (FCDSS) for Hydropower Station

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Abstract: Based on basic principle of Decision Support System (DSS) and according to requirements and real conditions for flood control of hydropower station, theory of FCDSS for a hydropower station is studied thoroughly in aspect of its functions, structures, database subsystem, interface subsystem and model subsystem. The research findings have been applied in hydropower station with satisfactory results.

Key words: flood control; decision support system; hydropower station; database management system; interface; model