Evaluation of Kalid Shawkat's Method For Salat Time

M. N. Tarabishy, Ph.D.

goodsamt@gmail.com

Abstract:

In this work we have analyzed the validity of Dr. Kalid Shawkat's method for calculating prayer time for Isha. The main claim is that using a fixed angle for the depression (twilight) is not right because according to him the angle is variable and depends on the season and the latitude.

Our analysis found that his method has serious problems and would give wrong time for Isha.

Introduction:

Muslims in Detroit, USA face long fasting days during the summer and they would welcome earlier Isha time that would allow them to finish Taraweeh earlier so they can go home and get a few precious sleeping hours. Dr. Khalid Shawkat has conducted a seminar about two months before Ramadan about a new method he developed for calculating the timing of Fajr and Isha. His method gives Isha that is over 30 minutes earlier than the 15 degrees twilight angle used by most Salat programs.

The seminar has caused a lot of discussions about the subject, and before Ramadan by two weeks I was asked to give my opinion about the issue. In essence Imams needed a second opinion about changing the Isha time by more than 30 minutes earlier than its current schedule.

Knowing Dr. Shawkat as a well known scholar who has contributed greatly to the area of Islamic astronomy, I was excited about the prospect of earlier Isha time, however, I needed to do my due diligence by looking into his work and I was hoping it would be a simple matter of confirmation.

I started by gathering as much information as possible about his method. I looked up his web site and found a general description where the method's essence is gathering actual observations of the Fajr / Isha times and then curve fitting the data and building a function that gives the times.

According to Dr. Shawkat, those times are a function of the latitude and the time of the year, and therefore, according to him the traditional use of a fixed solar twilight or depression angle (18, or 15, ...) is not correct.

I wanted to see more details so I contacted him via email and requested specific details about his data and how it was collected and processed, however, Dr. Shawkat made it clear that he was very busy to work with me, so, I had to do with the public information available.

I started with the Salat schedule of Ramadan. I printed his for Detroit and printed the usual schedule that uses 15 degrees for both Fajr and Isha (both schedules are attached in the appendix)

Isha Time Difference:

Upon comparison with the usual Salat schedule, Dr. Shawkat's method gave a time for Isha that is an impressive half an hour earlier for the whole month. The rest of the schedule for Ramadan was virtually the same. Upon this, I set out to find the equivalent depression angle for his schedule, and using a program I have written some time ago, I found that the equivalent angle for Isha was a surprising 11 degree, so I found that using 15 degrees for Fajr and 11 degrees for Isha I could get his schedule.

I contacted him and informed him about my finding and asked him how can 11 degrees for depression angle be sufficient.

His answer was that he checked his calculations and he found his angle a little above 11 degrees (11.6) to be accurate, and he suggested that the angle seems small because people have always used bigger angles, and we should be more concerned about the time between Magreb and Isha which was, according to his schedule, about one hour and 11 minutes and that seemed to be sufficient in his opinion. To bolster his position he invoked a historic incident at the time of the prophet (blessing be upon him) in which the time between Magrib and Isha prayer was the time needed to read 50 verses of the Quran, and he estimated that 50 verses to take about 50 minutes, therefore, in comparison, an hour and eleven minutes were not too little.

The first point here is that time can't be used directly for deciding the sky illumination because the Sun could have a shallow path so it takes much more time for it to dip sufficiently for darkness to set in. However, I was curious about the historic incident and wanted to look at the prayer times in Madina, so, I assumed that the time for reading 50 verses was about an hour, and when I ran my program for Madina using 15 degrees twilight angle for Isha, I got some days that indeed had an hour between Magib and Isha.

Fajr Measurement Data:

Although Fajr timing was not disputed, Dr. Shawkat provided a set of his data for our consideration. The data is a set of 23 observations for Fajr near Birmingham, UK. The data is given in figure 1.

To make sense of the data below, we plotted the angle Dr. Shawkat used vs. day of the year. The plot is given in figure 2.

The first thing to notice is the gaping hole in the middle and that would cause problems in trying to construct a model, however, for this set, the best fit using regression analysis gave a fixed angle of 14.46, therefore, I think using an angle of 15 degrees seems to be very reasonable.

Therefore, Dr. Shawkat's own data fits constant angle and it is 15 degrees.

Critics reports:

Upon some investigation of the issue, we found at least two critical reports of Dr. Shawkat's method.

The complaints are similar, chief among them is the lack of cooperation in providing the data for close examination. The observations were done in high light pollution areas, small unrepresentative sample, and questionable observers qualifications. His data contradicts confirmed correct measurements, and there is also the issue of the lack of recognition by scholars especially in Pakistan.

Fajr Observations made in Near Birmingham, UK
Latitude=52.4 Longitude=-1.95
Latitude=52:2 Longitude=-1:57W

				Near BirminghamUK	Lt=52:26N	Lg= 1:57W	TIME ZONE=GMT-0		Summer TZ=GMT-1	
	Date	Time	Sun @ °	Date (Day)	Fajr18 °	Fajr15 °	Fajr12 °	1st Light	Tabayyan	Fajr	DegFjr
3-Dec	3/12/2014	6:29	-12.7	Dec 3 (Wed)	5:53a	6:13a	6:34a	6:17a	6:31a	6:18a	14.36
10-Dec	10/12/2014	6:32	-13.4	Dec 10 (Wed)	6:00a	6:20a	6:41a	6:25a	6:39a	6:26a	14.27
19-Dec	19/12/2014	6:40	-13.2	Dec 19 (Fri)	6:07a	6:28a	6:49a	6:32a	6:46a	6:33a	14.29
25-Dec	25/12/2014	6:45	-12.9	Dec 25 (Thu)	6:10a	6:31a	6:52a	6:35a	6:49a	6:36a	14.28
11-Jan	11/1/2015	6:44	-13	Jan 11 (Sun)	6:10a	6:30a	6:51a	6:33a	6:47a	6:34a	14.52
19-Jan	19/01/2015	6:39	-13	Jan 19 (Mon)	6:05a	6:25a	6:46a	6:26a	6:41a	6:28a	14.7
24-Jan	24/01/2015	6:35	-12.9	Jan 24 (Sat)	6:01a	6:21a	6:41a	6:20a	6:35a	6:22a	14.93
6-Feb	6/2/2015	6:13	-13.7	Feb 6 (Fri)	5:45a	6:05a	6:25a	6:01a	6:17a	6:04a	15.2
18-Feb	18/02/2015	5:54	-13.5	Feb 18 (Wed)	5:25a	5:45a	6:04a	5:39a	5:55a	5:42a	15.46
22-Feb	22/02/2015	5:48	-13.2	Feb 22 (Sun)	5:17a	5:37a	5:56a	5:31a	5:47a	5:34a	15.5
23-Feb	23/02/2015	5:46	-13.2	Feb 23 (Mon)	5:15a	5:35a	5:54a	5:28a	5:45a	5:32a	15.5
24-Feb	24/02/2015	5:45	-13	Feb 24 (Tue)	5:13a	5:33a	5:52a	5:26a	5:43a	5:30a	15.49
27-Feb	27/02/2015	5:40	-12.9	Feb 27 (Fri)	5:07a	5:27a	5:46a	5:20a	5:37a	5:24a	15.45
20-Apr	20/04/2015	4:13	-14.7	Apr 20 (Mon)	3:43a	4:11a	4:37a	4:17a	4:27a	4:19a	14.18
21-Apr	21/04/2015	4:11	-14.6	Apr 21 (Tue)	3:39a	4:08a	4:34a	4:15a	4:25a	4:16a	14.2
22-Apr	22/04/2015	4:10	-14.4	Apr 22 (Wed)	3:36a	4:05a	4:32a	4:12a	4:22a	4:14a	14.1
27-Apr	27/04/2015	4:02	-13.7	Apr 27 (Mon)	3:18a	3:50a	4:18a	4:01a	4:10a	4:02a	13.83
28-Apr	28/04/2015	4:00	-13.6	Apr 28 (Tue)	3:14a	3:47a	4:16a	3:59a	4:07a	4:00a	13.74
7-May	7/5/2015	3:34	-13.6	MAY 7 (Thu)	2:38a	3:19a	3:52a	3:40a	3:46a	3:40a	13.18
13-May	13/05/2015	3:24	-13	MAY 13 (Wed)	2:07a	3:00a	3:36a	3:24a	3:33a	3:28a	12.78
17-May	17/05/2015	3:15	-12.9	MAY 17 (Sun)	1:38a	2:46a	3:26a	3:13a	3:25a	3:20a	12.56
20-May	20/05/2015	3:06	-13	MAY 20 (Wed)	----	2:36a	3:19a	3:06a	3:19a	3:15a	12.36
23-May	23/05/2015	2:59	-12.9	MAY 23 (Sat)	----	2:25a	3:12a	2:59a	3:14a	3:10a	12.18

Dear Dr. Shahid Merali, I looked at your Fajr Observational data very carefully and spend ample time analyzing them. I found out that my calculated times (based on latitude and seasons) are pretty good for your location. They are a little conservative (about 10 minutes) from Dec to Feb, but very close in April to Mid-May and within 5 minutes in late May.

Figure 1. Data for Fajr time near Birmingham, UK

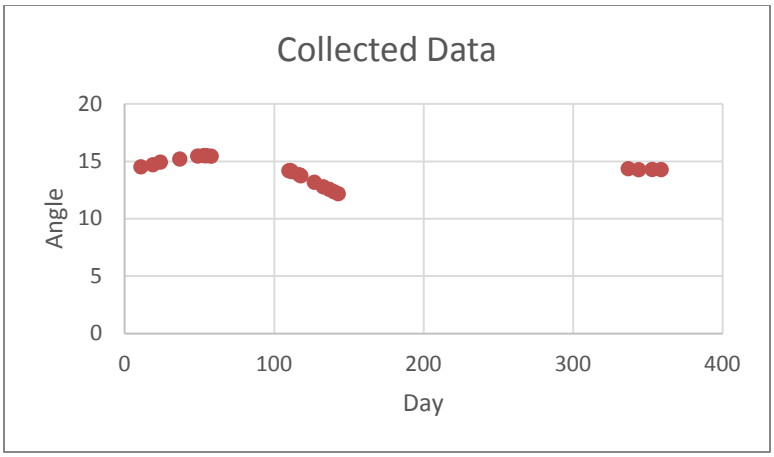

Figure 2. Mr. Shawkat's Fajr data representation

Conclusions:

- Using twilight angle of 11 degrees for Isha doesn't meet the minimal requirement of darkness of the sky because below 12 degrees there are parts of the sky along the line of sight of the observer that are still directly illuminated by the Sun.
- The fixed angle method has been used for over a thousand years during and we didn't see a strong evidence that proves its inadequacy.
- The smallest reported angle in the literature is 14 degrees, however, the most popular angle is 18 degrees with countless verification data and studies. Historically, the smallest used angle is 15 degrees that was suggested by the great scholar AL Bairuni.
- We suggest that Mr. Shawkat publish his method in detail so that it can be studied and analyzed and perhaps improved. The results of the method that it gives now indicate that there are some problems with the method that render it unusable.

References:

http://www.moonsighting.com/

http://www.wifaqululama.co.uk/articlespdf/Salaah/Prayer-Fasting-Times-Clarification-of-Issue.PDF

http://www.masjideumer.org.uk/downloads/Analysisoftimetables_July2011.pdf

http://graphics.tu-bs.de/static/people/magnor/publications/tog05.pdf

Salat table for Ramadan according to Shawkat

Jun 17 (Wed)	04:04 am	05:55 am	01:39 pm	05:38 pm	09:16 pm	10:29 pm
Jun 18 (Thu)	04:04 am	05:55 am	01:39 pm	05:38 pm	09:16 pm	10:29 pm
Jun 19 (Fri)	04:04 am	05:55 am	01:40 pm	05:39 pm	09:17 pm	10:30 pm
Jun 20 (Sat)	04:04 am	05:56 am	01:40 pm	05:39 pm	09:17 pm	10:30 pm
Jun 21 (Sun)	04:04 am	05:56 am	01:40 pm	05:39 pm	09:17 pm	10:31 pm
Jun 22 (Mon)	04:04 am	05:56 am	01:40 pm	05:39 pm	09:17 pm	10:31 pm
Jun 23 (Tue)	04:04 am	05:56 am	01:40 pm	05:40 pm	09:17 pm	10:31 pm
Jun 24 (Wed)	04:05 am	05:57 am	01:41 pm	05:40 pm	09:18 pm	10:31 pm
Jun 25 (Thu)	04:06 am	05:57 am	01:41 pm	05:40 pm	09:18 pm	10:31 pm
Jun 26 (Fri)	04:06 am	05:57 am	01:41 pm	05:40 pm	09:18 pm	10:31 pm
Jun 27 (Sat)	04:07 am	05:58 am	01:41 pm	05:40 pm	09:18 pm	10:31 pm
Jun 28 (Sun)	04:07 am	05:58 am	01:41 pm	05:40 pm	09:18 pm	10:30 pm
Jun 29 (Mon)	04:08 am	05:59 am	01:42 pm	05:41 pm	09:18 pm	10:30 pm
Jun 30 (Tue)	04:09 am	05:59 am	01:42 pm	05:41 pm	09:18 pm	10:30 pm
Jul 01 (Wed)	04:10 am	06:00 am	01:42 pm	05:41 pm	09:17 pm	10:29 pm
Jul 02 (Thu)	04:10 am	06:00 am	01:42 pm	05:41 pm	09:17 pm	10:29 pm
Jul 03 (Fri)	04:11 am	06:01 am	01:42 pm	05:41 pm	09:17 pm	10:28 pm
Jul 04 (Sat)	04:12 am	06:01 am	01:43 pm	05:41 pm	09:17 pm	10:28 pm
Jul 05 (Sun)	04:13 am	06:02 am	01:43 pm	05:41 pm	09:17 pm	10:27 pm
Jul 06 (Mon)	04:14 am	06:02 am	01:43 pm	05:41 pm	09:16 pm	10:27 pm
Jul 07 (Tue)	04:15 am	06:03 am	01:43 pm	05:41 pm	09:16 pm	10:26 pm
Jul 08 (Wed)	04:16 am	06:04 am	01:43 pm	05:41 pm	09:16 pm	10:26 pm
Jul 09 (Thu)	04:17 am	06:04 am	01:43 pm	05:41 pm	09:15 pm	10:25 pm
Jul 10 (Fri)	04:18 am	06:05 am	01:44 pm	05:41 pm	09:15 pm	10:24 pm
Jul 11 (Sat)	04:19 am	06:06 am	01:44 pm	05:41 pm	09:14 pm	10:24 pm
Jul 12 (Sun)	04:20 am	06:07 am	01:44 pm	05:41 pm	09:14 pm	10:23 pm
Jul 13 (Mon)	04:21 am	06:07 am	01:44 pm	05:41 pm	09:13 pm	10:22 pm
Jul 14 (Tue)	04:22 am	06:08 am	01:44 pm	05:41 pm	09:13 pm	10:21 pm
Jul 15 (Wed)	04:23 am	06:09 am	01:44 pm	05:41 pm	09:12 pm	10:20 pm
Jul 16 (Thu)	04:24 am	06:10 am	01:44 pm	05:41 pm	09:11 pm	10:19 pm

Salat table for Ramadan using ISNA method but using angles 15 F/ 11 Isha

17	Wed	4:07	5:53	1:36	5:40	9:15	10:27
18	Thu	4:07	5:53	1:36	5:40	9:15	10:27
19	Fri	4:07	5:53	1:37	5:41	9:16	10:28
20	Sat	4:07	5:53	1:37	5:41	9:16	10:28
21	Sun	4:07	5:53	1:37	5:41	9:16	10:28
22	Mon	4:07	5:53	1:37	5:41	9:16	10:28
23	Tue	4:07	5:53	1:37	5:42	9:17	10:29
24	Wed	4:08	5:54	1:38	5:42	9:17	10:29
25	Thu	4:08	5:54	1:38	5:42	9:17	10:29
26	Fri	4:08	5:54	1:38	5:42	9:17	10:29
27	Sat	4:09	5:55	1:38	5:42	9:17	10:29
28	Sun	4:09	5:55	1:38	5:42	9:17	10:29
29	Mon	4:10	5:55	1:39	5:43	9:17	10:29
30	Tue	4:10	5:56	1:39	5:43	9:17	10:29
1	Wed	4:11	5:56	1:39	5:43	9:17	10:29
2	Thu	4:12	5:57	1:39	5:43	9:17	10:28
3	Fri	4:12	5:57	1:39	5:43	9:17	10:28
4	Sat	4:13	5:58	1:40	5:43	9:16	10:28
5	Sun	4:14	5:58	1:40	5:43	9:16	10:27
6	Mon	4:15	5:59	1:40	5:43	9:16	10:27
7	Tue	4:16	6:00	1:40	5:43	9:16	10:27
8	Wed	4:17	6:00	1:40	5:43	9:15	10:26
9	Thu	4:18	6:01	1:40	5:43	9:15	10:25
10	Fri	4:19	6:02	1:41	5:43	9:14	10:25
11	Sat	4:20	6:02	1:41	5:43	9:14	10:24
12	Sun	4:21	6:03	1:41	5:43	9:14	10:24
13	Mon	4:22	6:04	1:41	5:43	9:13	10:23
14	Tue	4:23	6:05	1:41	5:43	9:13	10:22
15	Wed	4:24	6:05	1:41	5:43	9:12	10:21
16	Thu	4:26	6:06	1:41	5:43	9:11	10:20