ITFNZ Technical Advisory Group
28-Dec-2015

Sine Wave in ITF Tae-kwon Do

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Acknowledgements

The author acknowledges Mr Simon Mallinson (V Degree ITFNZ) for allowing the use of his personal library in research for this essay.

1.0 Introduction

This essay defines what sine wave is in both a theoretical and practical sense, explains the Theory of Power ansd how sine wave contributes to power, and traces a history of sine wave development in ITF Taekwon-Do with reference to various historical ITF Taekwon-Do textbooks.

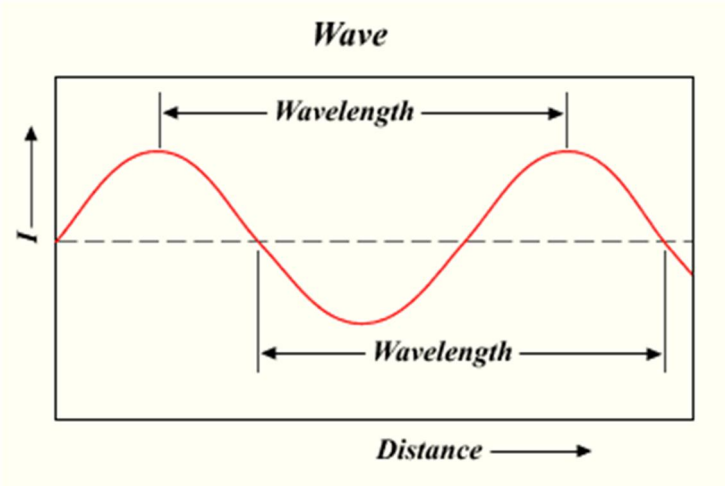
2.0 What is Sine Wave?

2.1 The Science Definition

Physics defines a wave "as a movement up and down or back and forth"[1]. In turn, sine wave is defined as "a wave whose waveform resembles a sine curve[2]". Sine wave can also be described as a mathematical curve that describes a smooth repetitive oscillation[3]. The time it takes for an oscillation to be completed is referred to as the wavelength.

Figure 1 below sets out a sine wave (curve).

Figure 1: A Sine Wave (Curve)



2.2 In ITF Tae-kwon Do

In ITF Taekwon-Do, sine wave is properly meant to refer to the up and down movement of the body (and thus the hip) during the execution of techniques, to contribute to the maximum utilisation of the mass of the participant at the moment of impact.

Mass is one component of the Theory of Power which underpins ITF Taekwon-Do technique. The Theory of Power is briefly explained in the next section of this essay.

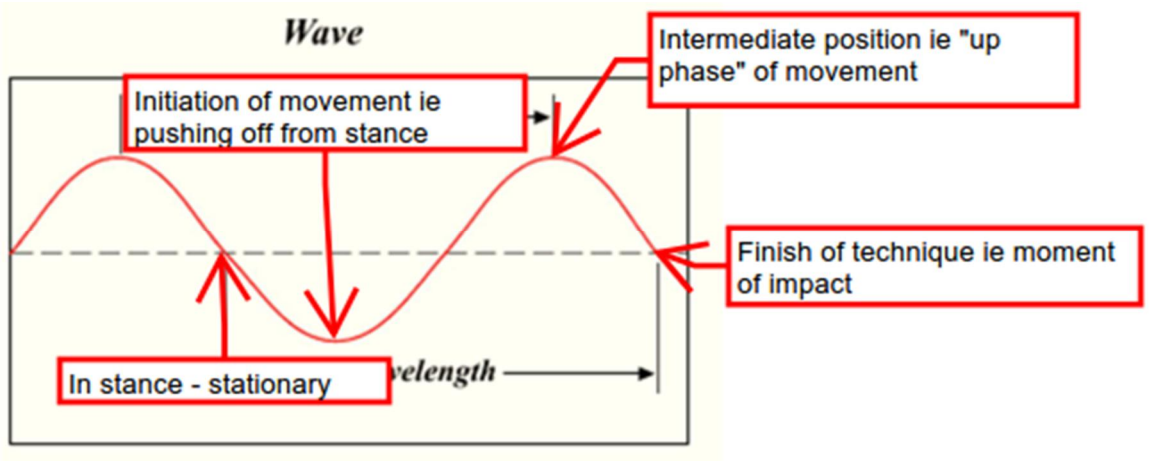
Figure 2 below provides annotations to Figure 1 to illustrate sine wave with reference to movement phases in ITF Tae-kwon Do technique. The extent (or depth) of the sine wave in Figure 2 should not be viewed too literally in terms of ITF Taekwon-Do technique. The use of the term sine wave is a very useful analogy for an instructor to explain to the student the body/hip rising and dropping motion, and is also a useful visual prompt for the learning student.

In practice the first/initiation phase of the ITF "sine wave" is a subtle movement produced as the participant moves forward from their stance and slightly relaxes their supporting leg. The second phase is the "up phase" where the legs straighten slightly from the first phase position, the hip/body rises, and the intermediate position for the

[1] Ibid
[2] Based on WordNet 3.0, Farlex clipart collection. © 2003-2012 Princeton University, Farlex Inc
[3] https://en.wikipedia.org/wiki/Sine_wave

technique is formed. The final phase see's the body weight being dropped (as well as the hip, breath, reaction hand, concentration and stance utilised) as the technique is executed from the intermediate position.

Figure 2: A Sine Wave annotated with ITF Taekwon-Do technique movement phases



2.3 The Theory of Power

There are two components to the scientific formula for calculating power. Those two components are mass and velocity (speed). The formula is set out below:

$P = ½ MV^2$

where:

- P stands for power
- ½ is a constant
- M stands for mass
- V stands for velocity

From the above formula it can be seen that while speed is an important component of power, any movement that can increase the mass involved in a technique is advantageous. In this regard, using the sine wave or body rising/dropping motion to increase the mass involved in a technique will assist with generating power.

3.0 History of development of Sine Wave in ITF Taekwon-Do

3.1 1965

The original English language textbook for Taekwon-Do was written by General Choi and was entitled Taekwon-Do: The Korean Art of Self Defence. It was first published in 1965. In the 1972 edition of the book there is no reference to sine wave. Neither is there any reference to the components of sine wave such as knee spring or body weight dropping.

The Theory of Power is explained very early in the book (page 16) and four components are set out: Reaction Force, Concentration, Equilibrium, and Breath Control.

There is no mention of mass in the1965 explanation of the Theory of Power as there is in later Taekwon-Do manuals authored by General Choi (as discussed later in this essay). It appears that in the mid-1960's (very early in the development of Taekwon-Do) emphasis was firmly placed on the use of the hip and reaction hand to generate power within the wider construct of the Theory of Power outlined above.

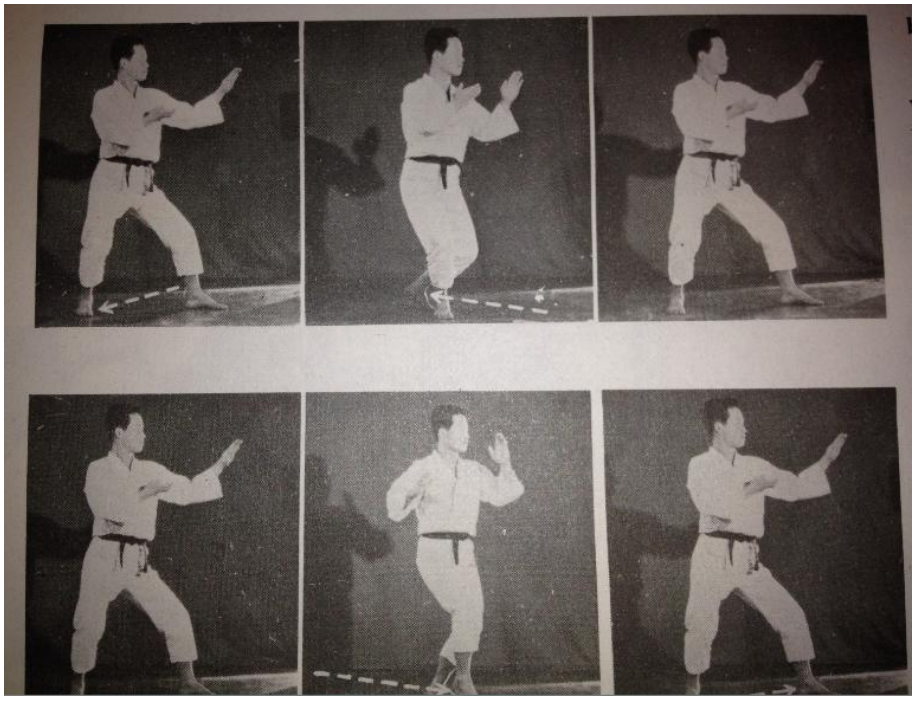
This is reflected in the following excerpt from the section of the book[4] on Essential Hand Attack Techniques, where the basic principles for such techniques are set out as follows:

[4] See page 44

1. "***Jerk the hip and abdomen sharply at the beginning of action***[5]*.*
2. *Twist completely the striking point, with a few exceptions, and concentrate all muscles of the body at the moment of impact.*
3. *Tense the abdomen at the moment of impact.*
4. *The moment the striking point reaches the target, pull it back (this allows the striking point to be ready for next movement without it being grabbed by the opponent).”*

The lack of any emphasis on knee spring or body weight dropping is well illustrated in Figure 3 below, taken from page 143 of the book. As can be seen, the demonstrator's legs remain bent at the same angle and the head remains at the same height throughout the stepping and blocking motion.

Figure 3 - Illustration of Knife Hand Guarding Block stepping forward and backwards in Back (now L) Stance in 1972 edition of Taekwon-Do: The Art of Self Defence



Part 5 of the book covers Patterns in Taekwon-Do. On page 173 the following points are set out for those performing patterns to bear in mind:

1. *Performance of each pattern must be ended at the starting point (x).*
2. *Correct posture and facing must be maintained at all times.*
3. *The muscles of the body should either be tensed or relaxed at the critical moments in the course of the exercise.*
4. *The exercise should be performed with a graceful and rhythmic movement to reduce unnecessary waste of energy, and there should be no stiffness.*
5. *Movements must accelerate or decelerate according to that stipulated by the particular pattern.*
6. *Practice should be made perfect in one pattern before attempting another*.

Again, there is no mention of knee spring or body weight dropping in the above points.

3.2 1972

In 1972 the first edition of the Taekwon-Do "Condensed Encyclopedia[6]" was published. In similar fashion to the original 1965 text book, the 1972 Condensed Encyclopedia contained no reference to mass in its explanation of

[5] Authors emphasis added

the Theory of Power. Neither were there any references to body weight dropping in any of the technical explanations of attack and defence techniques.

However, in the explanation[7] of Equilibrium in the Theory of Power section of the 1972 Condensed Encyclopedia, there is reference to "flexibility and knee spring" as important factors in maintaining balance. Further, the Basic Principles for the Forefist Punch[8], include the following principle:

"11. *Raise the hip slightly at the beginning of the punch, and lower it at the moment of impact*"

These references were not present in the 1965 book, and may represent the beginning of the technical development of Sine Wave.

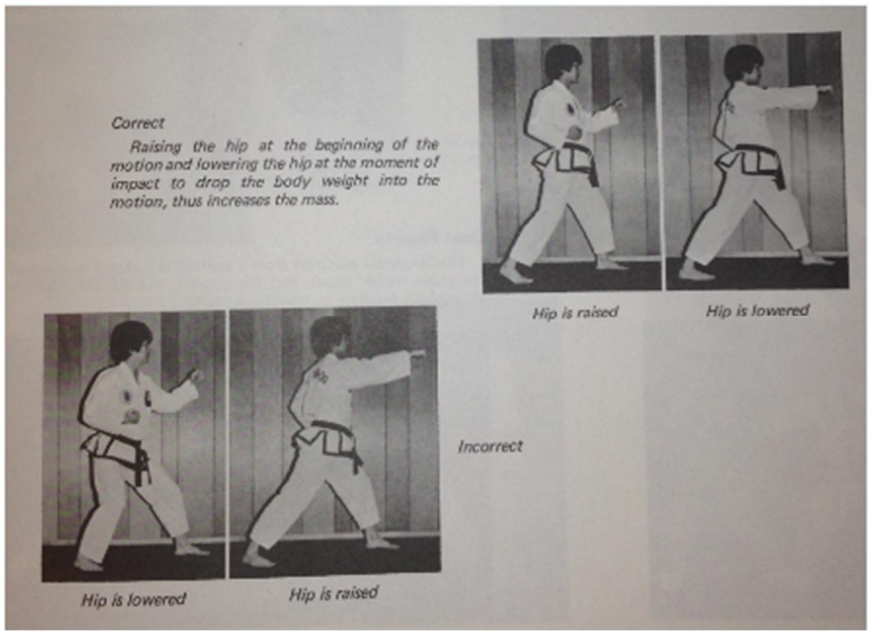
3.3 1983

In the 1983 edition of the Condensed Encyclopedia[9], Mass had been introduced as an additional component of the Theory of Power. The explanation of Mass is set out below, with the authors emphasis added where appropriate:

"*Mathematically the maximum kinetic energy or force is obtained from maximum body weight and speed and it is all important that the body weight be increased during the execution of a blow. No doubt the maximum body weight is applied with the motion by turning the hip. The large abdominal muscles are twisted to provide additional body momentum. Thus the hip rotates in the same direction as that of attacking or blocking tool as figure F.* ***Another way of increasing body weight is the utilisation of a springing action of the knee joint. This is achieved by slightly raising the hip at the beginning of motion and lowering the hip at the moment of impact to drop the weight into the motion****…..*".

The motion described by the above explanation is well illustrated at page 97 of the 1983 Condensed Encyclopedia as set out in Figure 4 below:

Figure 4: Illustration from 1983 edition of the Condensed Encyclopedia showing correct hip raising and dropping



[6] Hong Hi, Choi. 1972. Taekwon-Do (The Korean Art of Self Defence). First Edition. International Taekwon-Do Federation. Missisauga, Canada.
[7] See page 26
[8] See page 85
[9] It is noted that there were second, third and fourth editions of the Condensed Encyclopedia published in 1975, 1978, and 1979 respectively however in preparing this essay the author has not access to any of these editions. It is possible that the addition of Mass to the Theory of Power may have been first included in one of these earlier editions.

The above indicates that by at latest 1983, and maybe earlier (ie in the mid to late 1970's), ITF Taekwon-Do technique had developed and formally incorporated a raising and dropping of the hip to drop the body weight into the technique.

3.4 1986

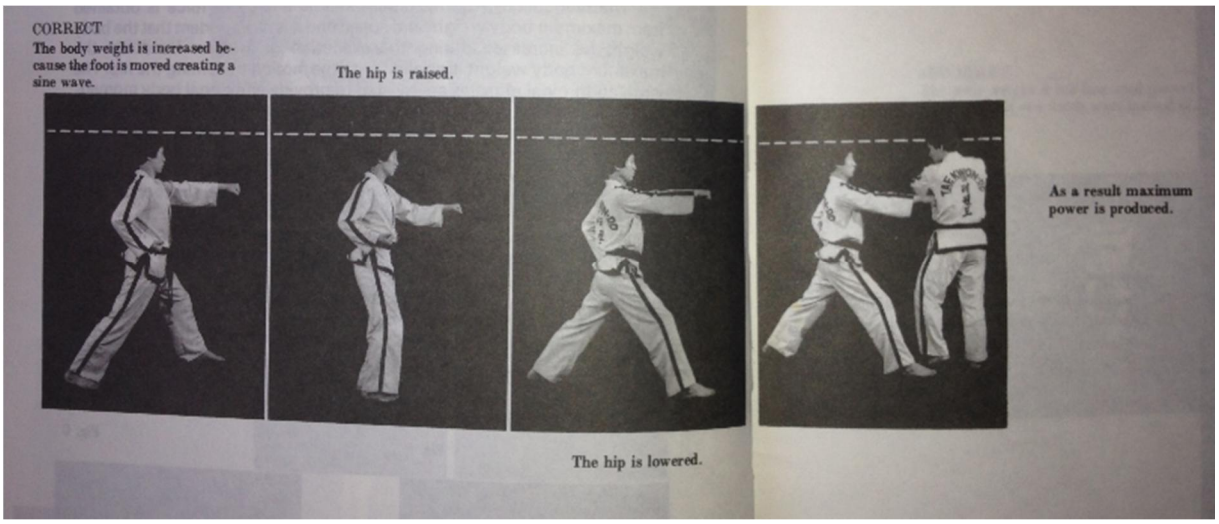
The 1986 edition of the Condensed Encyclopedia contains identical explanations of Mass (as part of the Theory of Power), and hip raising and lowering. The same images as in Figure 2 above were used to illustrate the correct hip raising and lowering technique.

3.5 1993

The third edition (1993) of the15 Volume Encyclopedia of Taekwon-Do contains the first formal reference to the term "sine wave" in the ITF Taekwon-Do textbooks reviewed as part of preparing this essay.

The 1983 and 1986 explanations of Mass as referenced above are carried through into the 1993 Encyclopedia. Updated illustrations and associated annotations are however introduced to demonstrate correct use of body weight. The annotations refer to "creating a sine wave" and are set out below.

Figure 5: Illustrations with reference to sine wave in the 1993 15 Volume Encyclopedia



In addition, page 10 of Volume 3 of the 1993 Encyclopedia sets out Common Principles for Hand Techniques, one of which is:

"*3. Raise the body slightly at the beginning of the motion, and lower it at the moment of impact in all cases*".

The updated illustrations and explanations of mass with reference to sine wave in the Theory of Power section of the 1993 Encyclopedia provide greater clarity of the above principle.

3.6 1999

The 1999 edition of the Condensed Encyclopedia contains identical explanations of Mass (as part of the Theory of Power), and hip raising and lowering with reference to sine wave. The same images as in Figure 5 above are used to illustrate the correct hip raising and lowering technique.

4.0 Conclusion

It appears that sine wave as a formal "named" component of ITF Taekwon-Do was not referenced until the mid-1970's.

The execution of the sine wave motion (or put more simply, body weight rising and dropping) in ITF Taekwon-Do movements remains an important differentiating factor between authentic ITF Taekwon-Do and other martial arts.

Sine wave is an integral (but not dominant) component of the Theory of Power, and if performed correctly increases the amount of force generated by techniques.

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