**Application of Philosophy Viewpoints to Promote Learning the Theory of Mine Pressure Subject (MPS)**

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**Abstract.** Philosophy, considered to be the mother of science research, can become a bridge for the cooperation of different subjects. Mine Pressure Subject (MPS) is essential to the mining engineering discipline in China so that how to improve the learning interest of MPS to let the learners grasp its theory and application technology is an important topic in the universities of mining industry. Philosophy viewpoints of dialectical materialism, such as epistemology, universal relation and eternal development principle, law of unity of opposites, and so on, are applied to prompt understanding and cognizing the scientific connotations of Mine Pressure Subject (MPS). By this way, the professional education can be synchronously facilitated as well as the quality education.

**Introduction**

China is one of the few countries in the world that take coal as its primary energy. Coal, more than 60% of which is used to generate electricity in China, accounts for about 62% of the primary energy, and in 2015 coal output was 3.69 billion tons [1], therefore, coal mining is the vast underground rock mechanics engineering. As the soul of mining engineering discipline, Mine Pressure Subject (MPS) is closely related to coal exploration and its mining technology, so it is no doubt MPS is essential to mining engineering discipline [2]. Mine Pressure Subject, almost concerning all the technical fields of mining engineering, therefore, is regarded as a abstruse and complex subject, furthermore, if learners of MPS don’t understand the mining process or mining technology, they will find it extraordinarily difficult to learn the subject well, so it seriously influences their learning interest and also put teachers of MPS into the embarrassing situation of difficult to teach. Obviously, how to improve the learning interest of MPS to let the learners grasp its theory and application technology is an important topic of the universities of mining industry [3]. Actually, basic contents and research methods of MPS can reflect many philosophy viewpoints of dialectical materialism, if these philosophy viewpoints can be flexibly used in the teaching of MPS, it can be a new and effective approach to trigger learners’ studying enthusiasm and stimulate their thinking, which can make the students not only learn of knowledge but also learn to analyze and solve problems.

**Relationship between Philosophy and Science Technology**

Philosophy, closely associated with specific scientific knowledge, is considered to be the mother of science research. Not only natural science but also humanities and social science develop with their philosophy backgrounds of times. Scientists in history attached great importance to the theoretical
thinking based on philosophy which can help them get the guidance of world outlook, epistemology and methodology to form the correct scientific thought and establish a reasonable scientific system. The influence of science and technology is external, that of philosophy is relatively hidden and easy to be neglected, and therefore finding out the philosophy viewpoints in the scientific knowledge is actually a kind of regression [4]. Science can be more interesting from the view of philosophy, philosophy can be more vivid if pondered by scientific point. Abstract concepts of philosophy are so substantial that through learning philosophy science and technology workers can develop their abilities of abstractly processing a large number of perceptual materials and identifying and grasping the essence of object attributes.

**Dialectical Materialism Epistemology to Guide the Research of MPS theory**

Marxist philosophy introduces practice viewpoints into the epistemology and sets up the dialectical materialism epistemology, it is pointed out that cognition is dynamic reaction of the subjects to the objective world on the practical basis of the subjects which completely follow the cognitive law of "practice-theory-further practice". In fact MPS theory is a series of scientific generalization of stope mining pressure phenomenon, because of the complexity of underground mining activities, scholars around the world put forward different interpretations on strata behavior regularity. For example, pressure arch hypothesis proposed by W. HACK who was a German scholar, pre-crack hypothesis by A. LAPAS who was Belgium, hinged rock block hypothesis by KUZNETSOV who was a former Soviet Union scholar, masonry beam hypothesis by QIAN Ming-gao who was Chinese [2]. These hypotheses according to different theories competed with each other for a long time although their purposes were to explain the strata behavior regularity, shown as Figure 1. All of these indicate that people’s understanding of objective things always be subject to the limit of their subjective conditions and objective conditions, therefore, people need to deepen and expand their understanding based on the constant practice and reveal the inner link of nature more clearly.

![Figure 1. Different interpretations on strata behavior regularity.](image.png)

**Prompt Understanding the Strata Behaviors of MPS by Universal Relation and Eternal Development Principle**

The material dialectics of Marxist philosophy says that anything in the universe exists in general connections and permanent development. Quantitative change and qualitative change are two kinds of state for the connection and development of anything, and quantitative change is the premise and foundation of qualitative change. But qualitative change can decides the nature and direction of the qualitative change which will be the inevitable result of quantitative change, namely quantitative
change is accumulated to a certain extent and inevitably induces qualitative change. Strata behaviors, the important part of MPS, refers to the mechanics phenomenon of surrounding rock, coal and all kinds of artificial support under the load of mine pressure, typical phenomenon of which is first weighting and periodic weighting. First weighting, changing process of which shown as figure 2, is the specific pressure phenomenon along with coal working face advancing under the condition of all-collapse method to deal with roof; when hanging area of main roof become large enough to reach its limit span, the main roof of working face is broken and sinks sharply which will result in the roof collapse accident. In figure 2, it can be seen that quantitative change is the process of hanging of main roof and qualitative change is the occurrence of first weighting from the broken main roof. Periodic weighting described as figure 3 happens after the first weighting of main roof, with the constant advance of coal working face, the main roof will experience the change process of "stability - instability - stability" which also conforms to the process of change from quantitative to qualitative.

Figure 2. Changing process of first weighting.

Figure 3. Changing process of periodic weighting.
Prompt Understanding the Strata Control of MPS by Law of Unity of Opposites

![Masonry beam structure](image)

**Figure 4.** Masonry beam structure.

![Uphill roadway](image)

**Figure 5.** Mining across uphill roadway.

The law of unity of opposites, a basic principle of knowing and changing the world for people, is the essence of dialectics and reveals the fundamental driving force of the development of anything. This law says that anything has inner differences and contradictions and contains the unity of the difference and contradiction [3]. Strata control, also the important part of MPS, refers to all kinds of measures of adjusting, changing and using the mine pressure. For example, masonry beam, a classic concept of strata control, is a kind of balance structure because of the strong level extrusion from the rotation of broken main roof which always split firstly on both sides of its bearing and then in the middle of the roof. Masonry beam can also be regarded as a three-hinged arch, shown as figure 4. The existence of masonry beam structure suggests that the main roof, even broken, do not immediately lose its bearing capacity and can transform from simple-supported-beam structure into masonry-beam structure, so it continues to protect the roof safety of working face.

For another example, Mining across Uphill Roadway (MAUR) is the mining technology of maintaining the uphill roadway below the coal seam, the traditional technology is to keep a certain length of coal seam above the uphill roadway which make it harder to maintain it because of the concentration pressure transferred by the coal seam from the overlying strata. By MAUR technology, the coal seam above the uphill roadway is exploited and the roof of the uphill roadway is damaged, shown as figure 5. It is interesting that the destructive method makes it easier to maintain the uphill roadway. Through these two examples, it can be concluded that according to the conflicts law of things “integrity” and “fracture” of the main roof is always relative just as “maintenance” and “damage” of MAUR technology, they often use their contradictory antithesis to support themselves and mutually testify their respective reasonability.

**Conclusions**

Philosophy is a bridge for the cooperation of different subjects, as for Mine Pressure Subject(MPS), through digging the philosophical viewpoints of MPS, philosophy not only can prompts deeply understanding the essence of mine pressure but also help to realize the intersection between MPS with other disciplines. Furthermore, it can be a new and effective approach to trigger learners’ studying...
enthusiasm and stimulate their thinking, which can make the students not only learn of knowledge but also learn to analyze and solve problems.

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