**Theory**

It is assumed that methocel is a power law fluid. The power law is of the form:

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| --- | --- | --- |
|  |  | (1) |

where is shear stress, and are empirically determined constants, and is a change in velocity per change in radial distance. is calculated by the equation

|  |  |  |
| --- | --- | --- |
|  |  | (2) |

which requires the pressure drop (*R*) and pipe radius, both of which are specified. In order to determine and , the relation

|  |  |  |
| --- | --- | --- |
|  |  | (3) |

was used. By fitting shear stress and velocity to a line, and was determined. The equation for friction loss due to flow through a circular pipe is

|  |  |  |
| --- | --- | --- |
|  |  | (4) |

where P is pressure, f is the Darcy friction factor, L is the length of the pipe, v is average velocity through the pipe, and D is the inner diameter of the pipe.

was found using a modified Reynolds number, given by

|  |  |  |
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|  |  | (5) |

and using a Non-Newtonian Moody chart.

In a system using water, the Reynolds number and friction factor would be given by equation 6.

|  |  |  |
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|  |  | (6) |

|  |  |  |
| --- | --- | --- |
|  | (turbulent). | (7) |

Once was acquired, an estimate of the pressure drop was obtained with the above relations.