

Title (en)  
Method and system for detecting bit-bounce

Title (de)  
Vorrichtung und Verfahren zum detektieren von longitudinalen Bewegungen eines Bohrgestänges

Title (fr)  
Méthode et système de détection du déplacement longitudinal d'un outil de forage

Publication  
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Application  
**EP 00400557 A 20000302**

Priority  
FR 9904941 A 19990419

Abstract (en)  
At least two values ( $R_f$ ,  $R_{wob}$ ) are calculated in real time.  $R_f$  is a function of the principal oscillating frequency of the weight at the bend WOH divided by the speed of rotation.  $R_{wob}$  is a function of the weight on the tool WOB estimated by the model reduce the measured signal of the weight at the bend WOH divided by the mean weight on the tool WOB0 . The method uses a physical model of the drilling process based on general equations for the mechanism and has the following stages: the parameters of the model are determined taking into account the characteristic parameters of the shaft and the drill string; the model is then reduced, keeping only some of the modes of the model matrix. The longitudinal behavior is calculated f the values of  $R_f$  and  $R_{wob}$ . The mean weight on the tool WOB0 is defined from the weight of the drill string and the weight at the mean bend.  $R_f$  is compared with an interval with milestones chosen so there is no dangerous longitudinal movement if  $R_f$  is in the defined interval. If  $R_f$  is in the interval, the danger is determined as a function of  $R_{wob}$ .  $R_f = 20 \text{ asterisk } f_{WOH} / \text{RPM0}$ , where  $f_{WOH}$  is the principal oscillation frequency in Hertz over the interval (0, 10) Hz, and RPM0 is the mean instantaneous speed of rotation at the surface, in turns/min. The milestones for the interval are 0.95 and 0.99.  $R_{wob} = \text{Swob}/\text{WOB0}$ , where Swob is the weight on the tool estimated from the signal at the mean bend and the model, and WOB0 is the mean weight on the tool, defined from the mass of the drill string and mean bend. For  $R_{wob}$  less than 0.6 there is no danger; for  $R_{wob}$  between 0.6 and 0.8 there is a medium danger and for  $R_{wob}$  greater than 0.8 there is extreme danger. Independent claims are also included for a system for applying the above method and the application of the method to determining the danger of drill string dysfunction by jumping.

Abstract (fr)  
La présente invention concerne un système et une méthode de génération d'alarme sur le comportement longitudinal effectif d'un outil de forage fixé à l'extrémité d'une garniture de forage entraînée en rotation dans un puits par des moyens d'entraînement situés en surface, dans laquelle on utilise un modèle physique du processus de forage fondé sur des équations générales de la mécanique. On effectue les étapes suivantes: on réduit le modèle pour ne conserver que les modes pertinents, on calcule au moins deux valeurs  $R_f$  et  $R_{wob}$ ,  $R_f$  étant une fonction de la fréquence principale d'oscillations du poids au crochet WOH divisée par la vitesse de rotation instantanée moyenne en surface,  $R_{wob}$  étant une fonction de l'écart-type du signal de poids sur l'outil WOB estimé par le modèle longitudinal réduit à partir de la mesure du signal de poids au crochet WOH, divisé par le poids sur l'outil moyen WOB0 défini à partir du poids de la garniture et du poids au crochet moyen; On détermine la dangerosité du comportement longitudinal dudit outil de forage à partir desdites valeurs de  $R_f$  et  $R_{wob}$ . <IMAGE>

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