



MeetSYS

Capter, structurer, partager les raisonnements

Agenda

- Qui sommes-nous ?
- LLMs : fonctionnement, avantages et limites
- Expertise et connaissances tacites : Quelles différences avec les connaissances explicites
- Usages et complémentarités Explicite / Tacite
- Exemples d'utilisation des LLMs dans un domaine industriel

Chiffres clés de Bassetti Group



**Plus de 30 ans
d'expérience**
dans le domaine du
Management de l'Expertise
Technique




**Plus de 180 000
utilisateurs**
de notre logiciel
Plus de 700 clients
à travers le monde



**30M€ de chiffre
d'affaires**
En 2022



15 filiales
dans le monde



Consultants PhD-Ingénieurs
à dominante technique



MEETSYS

Marque créée en 2013, filiale du
groupe Bassetti depuis 2022

Capitalisation de l'expertise technique
auprès d'industriels

Agrément CIR

- [illegible]

Présentation générale

- Un LLM génératif permet de **prédire le mot suivant** dans une séquence de texte, en fonction des mots précédents (transformers, têtes d'attention).
- Ils sont **autoregressifs**
- Les LLM sont entraînés sur un **corpus massif de données textuelles**, ce qui leur permet d'apprendre des relations entre les mots.
- Ce **pré-entraînement** est la clé de la capacité des LLMs à générer du contenu cohérent et contextuellement approprié.

Le chat se promène dans le jardin et chasse une ...??...

Avantages / inconvénients

Avantages

- Produit du contenu à partir d'un prompt
- Extrêmement simple d'utilisation
- Les réponses tiennent compte des prompts et des réponses précédentes >> Force la réflexivité de l'utilisateur par une interaction sous la forme d'un dialogue

Inconvénients

- L'outil peut halluciner, posant le problème de l'évaluation de la vraisemblance
- L'outil n'est pas un moteur de recherche !!!
- La réponse n'a pas de provenance : elle est générée par un algorithme
- Entraîné sur des données écrites...
- Le modèle induit des biais >> modèle probabiliste
- Confidentialité douteuse



**La qualité de la donnée d'entrée va
déterminer la qualité de la donnée de sortie**

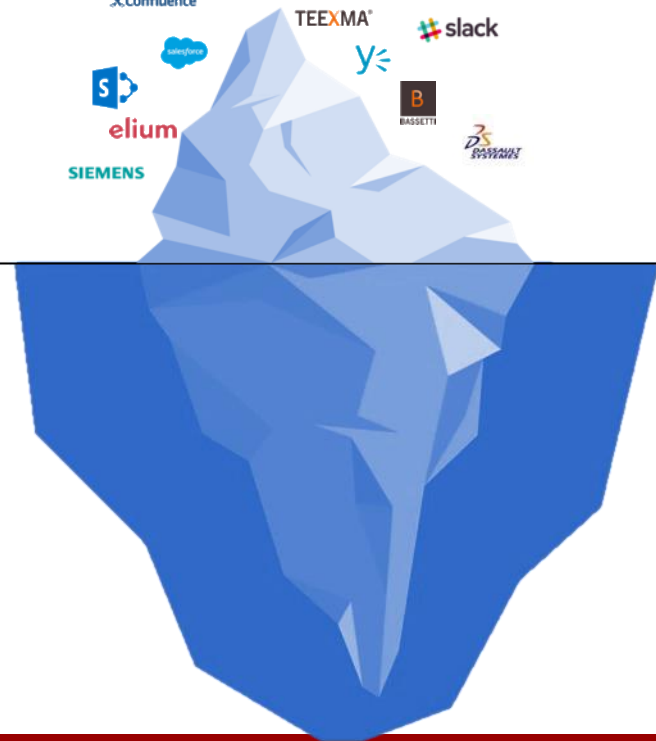
Différents types de connaissances



EXPLICITE



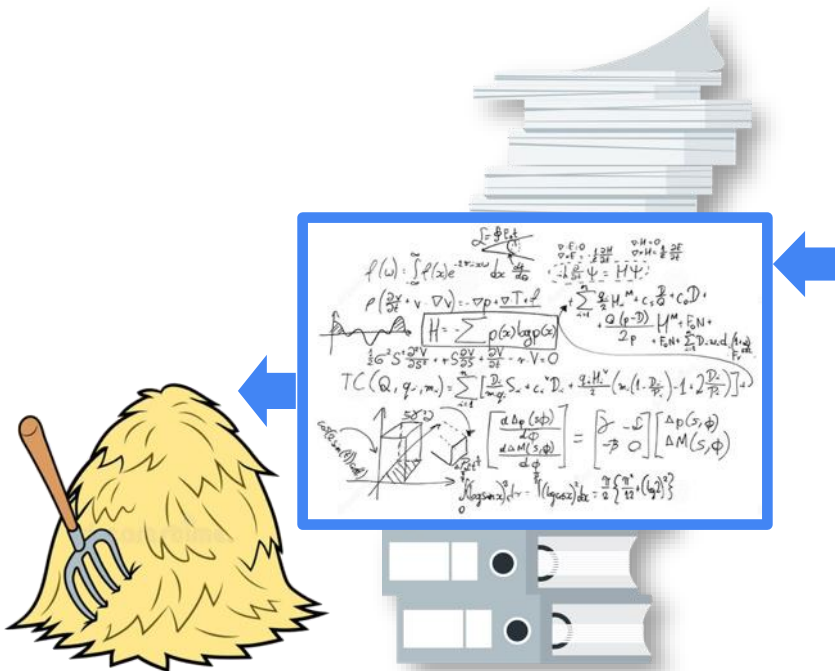
TACITE
=
Non écrite



Explicite vs tacite

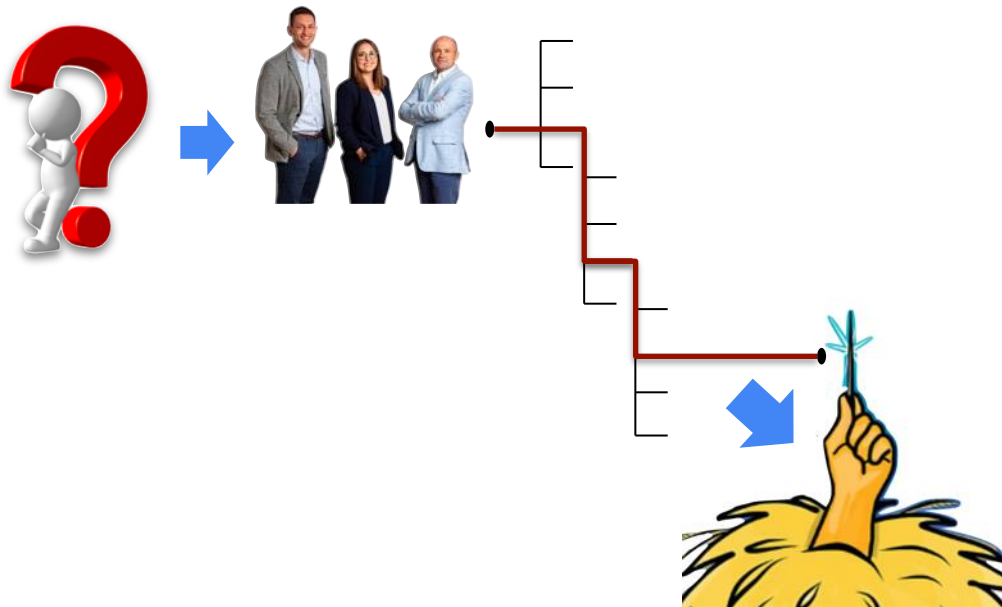
Information

- On recherche la réponse spécifique à sa question spécifique

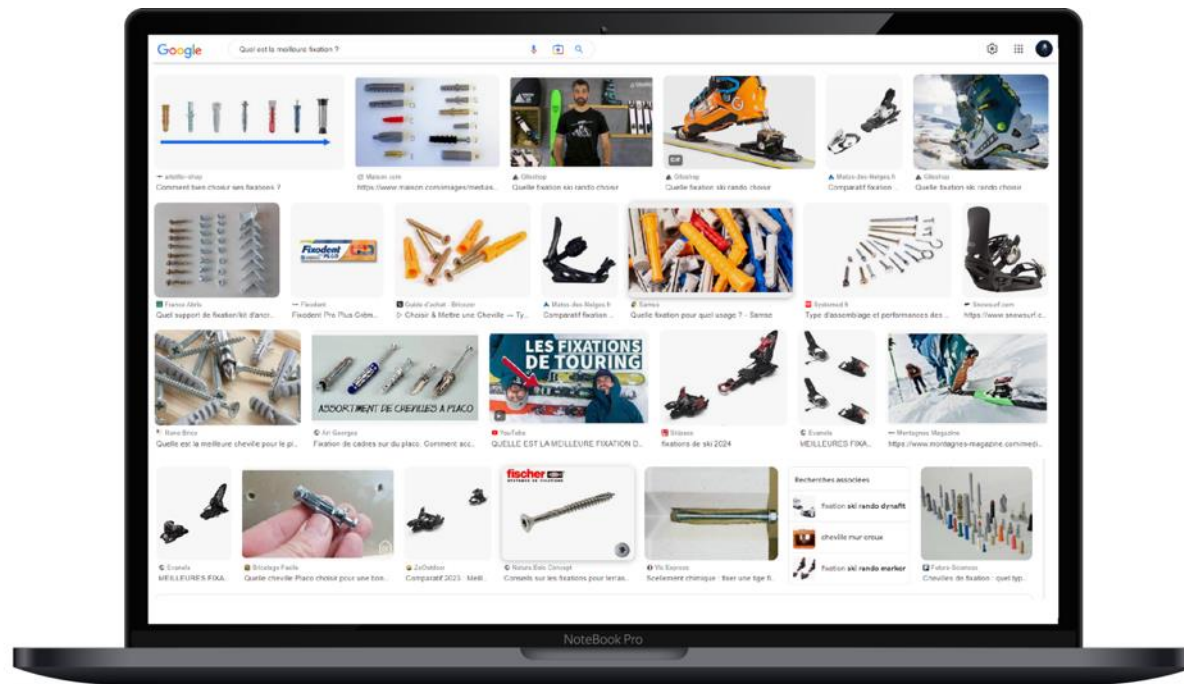


Expertise

- Process didactique amenant la réponse
- Raisonnement
- Le pourquoi
- L'historique



Exemple : Quel est le meilleur système de fixation ?



Exemple : Quel est le meilleur système de fixation ?

Question
d'usage

Quel est le meilleur système de fixation ?

Réponse



La Maison Naturelle
Equerre longue de bardag...

Les critères qui amènent la bonne réponse
contexte & processus basé sur les succès et échecs

Propositions



Génération de pages à partir de documents

Attention

- Le document doit être relativement court (fenêtre de contexte limitée)
- Le document ne doit parler que d'un seul et unique sujet
- La relecture par un expert est nécessaire pour une utilisation dans le cadre industriel (sécurité, qualité)

CAPILLARY PHENOMENA ON A LIQUID SURFACE

Mohammad Ali and Akira Umemura

Department of Aerospace Engineering, Graduate School of Engineering, Nagoya University
Furo-cho, Chikusa-ku, Nagoya 464-8603, Japan

Abstract: Contraction of a liquid sheet of an incompressible Newtonian fluid in a passive ambient fluid is studied computationally to provide insights into the dynamics of capillary wave created during contraction. The problem composed of the Navier-Stokes system is associated with initial and boundary conditions that govern the time evolution of the capillary wave and the pressure and velocity fields within it. The correctness of the algorithm is verified with the data of experiment. It can be found that the prediction of the computation agrees well with the experiment. The algorithm is capable of capturing the capillary wave and therefore it is used to study the characteristic phenomena of that wave created on the surface of the liquid. Results show that the capillary wave is radiated from the tip of the liquid sheet caused by surface tension. The amplitude of the tip wave is much larger than any other waves and the asymptotic approach of the wave peaks can be observed during the propagation of waves. The tip wave contains the highest pressure and gradually the peak values of both high and low pressures decrease with the propagation of waves. Fluid velocity is motivated by both pressure due to surface tension and recirculation in peak and trough of the wave. During the contraction of the liquid sheet, the tip velocity is not uniform. Initially the length of the sheet increases a little and very soon the contraction occurs and continues. After long time, the gradient of tip velocity becomes very small.

Keywords: Capillary wave, liquid sheet.

INTRODUCTION

There are many industrial processes where liquid spray is widely used in the system and an important factor for producing quality products. The purpose of liquid breaking in a spray is to increase the liquid surface area for increasing the subsequent heat and mass transfer. The spatial distribution, or dispersion of the droplets, is important in many combustion systems because it affects the mixing of fuel with oxidizer, which influences the flame length. Therefore to understand the mechanism of atomization is very important for its efficient application and to improve the design of practical combustion devices. Before occurring atomization, a wave of very small amplitude is formed on the liquid surface, which is called capillary wave. The detailed knowledge on the characteristics of capillary wave is required to understand the insight mechanisms for the disintegration of liquid. However, it is a difficult task to capture the capillary wave in numerical simulation. A suitable numerical algorithm is required to solve the problem. Several methods were proposed and in use for the simulation of such flow problems. These methods are discussed in reference¹⁻⁴. Gueyffier et al.¹ described a numerical scheme for interface calculations. The author used the volume of fluid interface tracking method and a piecewise linear interface calculation in the scheme. The method of interface tracking

Welch et al.⁴ used a VOF based interface tracking method in conjunction with a mass transfer model and used in simulation of horizontal film boiling problem. A new algorithm for the volume tracking of interfaces in two-dimensions was proposed by Rider and Kothe⁵. The method utilized local discrete material volume and velocity data to track liquid interfaces. A Flux Line-Segment model for two-dimensional problem was employed by Ashgriz and Poo⁶ for tracking the interfaces. All the above researchers used VOF method for two-phase flow problems with the conjunction of some other models and techniques. Therefore, it can be concluded that the VOF method is one of the most popular schemes for tracking interfaces and hence implemented in present algorithm. The section-3 of this paper describes the VOF technique a little in detail.

In liquid jet atomization, capillary instability and disintegration of liquid are important and interesting phenomena to the fluid dynamists. An earlier account of the work is summarized by Rayleigh⁷ who performed a delightful discussion on jet instability and published both theoretical and experimental results on capillary instability phenomena. During the contraction of liquid jet or cylindrical liquid drop the capillary waves are radiated on the fluid interfaces. These waves are caused by surface tension and generated at the tip of liquid jet. In an

Prompt

- write html code containing a description of the following document. The description should contain a short description of the effect, the mathematical formulas in latex rendered as images and two exemple of industrial application :

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Capillary Phenomena on a Liquid Surface 45

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Here is a possible HTML code containing a description of the document. The description should contain a short summary of the effect, the mathematical formulas in LaTeX rendered as images and two examples of industrial applications:

```
<html>
<head>
<title>Capillary Phenomena on a Liquid Surface</title>
</head>
<body>
<h1>Capillary Phenomena on a Liquid Surface</h1>
<p>This document presents a numerical investigation of the capillary waves that form on the surface of a liquid sheet due to surface tension. Capillary waves are small ripples that propagate along the interface between two fluids with different densities. The document describes the mathematical and numerical models used to simulate the problem, and compares the results with experimental data. Capillary waves are important for understanding the atomization and breakup of liquid jets and sheets, which have many industrial applications such as spray combustion, coating, printing and inkjet technologies.</p>
<h2>Mathematical Formulas</h2>
<p>The flow field is governed by time dependent three-dimensional Navier-Stokes equations with surface tension force. The equations can be expressed as:</p>

```



Nouvelle rubrique



Posez-moi une question...

<p>Where is the velocity vector, is the density. </p>

ABONNÉS

×



📄 ✓ SURFACE CAPILLARY

CONTENU

LIENS

FORUM

HISTORIQUE

CAPILLARY PHENOMENA ON A LIQUID SURFACE

This document presents a numerical investigation of the capillary [waves](#) that form on the surface of a liquid sheet due to [surface tension](#). Capillary [waves](#) are small [ripples](#) that propagate along the interface between two fluids with different densities. The document describes the mathematical and numerical models used to simulate the problem, and compares the results with experimental data. Capillary [waves](#) are important for understanding the atomization and breakup of liquid jets and sheets, which have many industrial applications such as spray [combustion](#), coating, printing and inkjet technologies.

MATHEMATICAL FORMULAS

The flow field is governed by time dependent three-dimensional Navier-Stokes equations with [surface tension](#) force. The equations can be expressed as:

$$\frac{\partial \rho \mathbf{v}}{\partial t} + \nabla \cdot (\rho \mathbf{v} \mathbf{v}) = -\nabla p + \nabla \cdot (\tau) + \mathbf{F}_{sv}$$

Where \mathbf{v} is the velocity vector, ρ is the density, p is the pressure, τ is the viscous stress tensor, and \mathbf{F}_{sv} is the [surface tension](#) force. The [surface tension](#) force is modeled by a continuum surface force (CSF) method, which interprets the [surface tension](#) as a continuous effect across an interface. The [surface tension](#) force can be written as:

$$\mathbf{F}_{sv} = \sigma \kappa \mathbf{n} f$$

Where σ is the [surface tension](#) coefficient, κ is the curvature of the interface, \mathbf{n} is the unit normal vector to the interface, and f is a function for smooth variation of the color variable (density) across the interface.

Vous n'avez pas
trouvé l'information
que vous cherchiez ?
Cliquez ici

🔍 PAGES

RECOMMANDÉES

[Capillary effect](#) +[Surface capillary waves method](#) +[Capillary pressure](#) +[Capillary contraction](#) +[Capillary condensation](#) +

... (15 autres)



EXPERTS



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Accueil

Tableau de bord

Toutes les fiches

Pages

+ Nouvelle page

Toutes les pages

★ Mes abonnements

Mes expertises

Mes recommandations

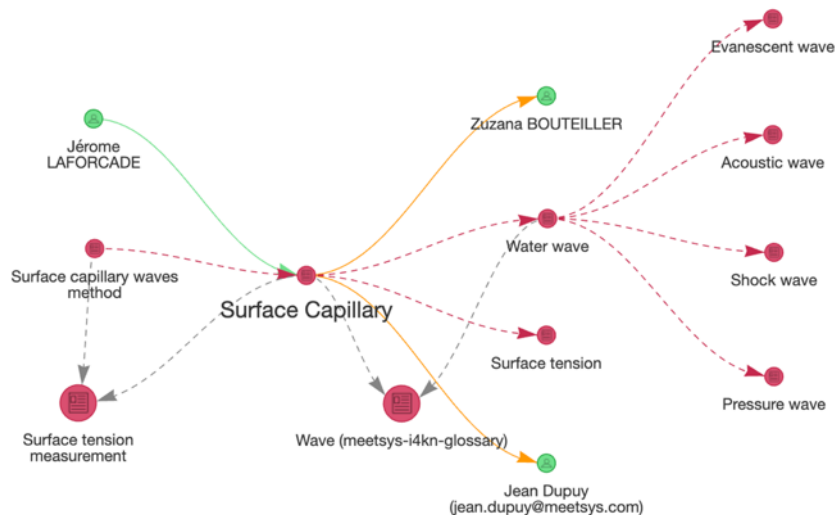
Mes créations

Mes modifications

Mes interventions

Exploitation des graphes de connaissances

Apports des réseaux de connaissances



- **Les graphes de connaissances donnent**
 - Les éléments pertinents périphériques au document sélectionné sous forme de graphes de dépendances
 - Une source de vérité basée sur l'expertise



Recherche en langage naturel à partir d'un chat bot

Attention

- La qualité des données d'entrée est clé
- La recherche des éléments sémantiquement et LOGIQUEMENT pertinents est clé (TFIDF, BM25, Knowledge Graphs...)
- Un outil informatique n'accède qu'à des données écrites, le tacite reste inutilisable alors qu'il représente 70% à 80% de la connaissance d'une entreprise.

TRANSCRIRE LES CONNAISSANCES TACITE EST CLE

Ex: Perplexity

comment réduire les contraintes mécaniques cycliques dans un cable fin ?

Sources

[PDF] Comportement et méthodes de dimensionnement des...

hal · 1

[PDF] Comportement
mécanique de fibres et
d'assemblages de fibre.

pastel.hal · 2

[PDF] RDM.pdf -
RESISTANCE DES
MATERIAUX

univ-biskra · 3

[Voir 5 de plus](#) Perplexity

Pour réduire les contraintes mécaniques cycliques dans un câble fin, plusieurs approches peuvent être envisagées :

Optimisation de la conception

Choix des matériaux

Sélectionner des matériaux avec une meilleure résistance à la fatigue et une plus grande élasticité peut aider à absorber les contraintes cycliques ⁴. Par exemple, opter pour des aciers à haute limite élastique ou des alliages spéciaux.

Géométrie du câble

- Augmenter légèrement le diamètre du câble pour répartir les contraintes sur une plus grande section ¹.
- Optimiser la construction du câble (nombre de torons, angle de tressage) pour améliorer sa flexibilité et sa résistance à la fatigue ².

Wrap up

- **Les LLM sont des technologies transformatives**
 - Qui nécessitent un contrôle à partir d'une vérité terrain pour une utilisation industrielle
 - Beaucoup de fausses promesses et fantasmes sont entretenues : le prompt magique n'existe pas
- Pour permettre d'en tirer parti de manière optimum, il est nécessaire
 - De **contrôler la qualité des données** utilisées par un LLM
 - **GARBAGE IN : GARBAGE OUT !!**
 - **D'écrire les données manquantes : connaissances tacites**
 - D'en **transcrire la logique** de ces connaissances sous la forme de **Knowledge Graphs**

Les LLM ne sont pas universels, pas encore...

Choisir des **solutions modulaires et faciles à faire évoluer**